The world's most comprehensive encyclopedia of the military weapons of the 20th century

WAR MACHINE

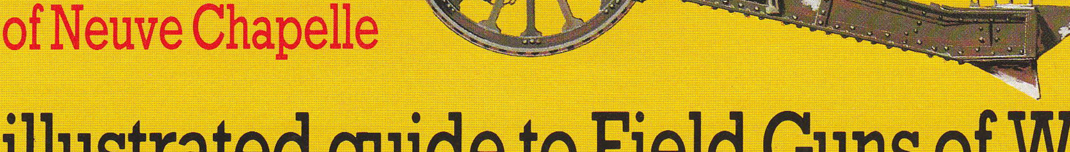
An ORBIS Publication

90p 115

IR £1.15 Aus $2.15 NZ $2.65 SA R2.45 Sing $4.50

Armed Forces of the World: India (Part 1)

Victory at Tannenberg



The Legend of the French '75'

The Battle of Neuve Chapelle

A fully illustrated guide to Field Guns of World War I

WAR MACHINE

Volume 10 **Issue 115**

Published by
Orbis Publishing Ltd

© Aerospace Publishing Ltd 1985

Editorial Offices
War Machine
Aerospace Publishing Ltd
179 Dalling Road
London W6 0ES

Managing Editor: Stan Morse
Editorial: Trisha Palmer
Chris Bishop
Chris Chant
Ian Drury

Design: Rod Teasdale
Colour Origination: Imago Publishing Ltd, Thame, Oxon

Typesetting: SX Composing Ltd

Film work: Precise Litho Ltd

Artists:
Ray Hutchins
Richard Hook

148511

Printed in Great Britain
by The Color Factory

Subscription Manager: Christine Allen
0488 72666

Consultant Editor: Major General Sir Jeremy Moore KCB OBE MC, Commander of British Land Forces during the Falklands campaign.

Distribution and marketing offices:
Orbis Publishing Ltd
Orbis House
20-22 Bedfordbury
London WC2N 4BT
Telephone: 01-379 6711

Circulation Manager: Brian Anderson
Marketing Manager: Paul Stelb

WAR MACHINE
Forthcoming issues feature:
Modern Naval Anti-aircraft Guns
Torpedo and Fast Attack Craft of World War II
Modern Underwater Weapon Systems
Flamethrowers of World War II
Modern Pistols

Picture acknowledgements

Cover photograph: Robert Hunt Library. **2281:** Robert Hunt Library/Imperial War Museum. **2282:** Imperial War Museum. **2283:** Imperial War Museum/Imperial War Museum. **2284:** Imperial War Museum/Robert Hunt Library. **2285:** Imperial War Museum/Imperial War Museum. **2286:** Imperial War Museum/Imperial War Museum/Imperial War Museum. **2287:** Robert Hunt Library. **2288:** Robert Hunt Library/Robert Hunt Library. **2289:** Imperial War Museum/Imperial War Museum. **2290:** Imperial War Museum. **2292:** Robert Hunt Library/Imperial War Museum. **2293:** Robert Hunt Library/Imperial War Museum. **2294:** Imperial War Museum/Robert Hunt Library/Imperial War Museum. **2295:** Robert Hunt Library/Robert Hunt Library/Robert Hunt Library. **2296:** Robert Hunt Library. **2297:** Robert Hunt Library. **2298:** Imperial War Museum. **2299:** Robert Hunt Library/Imperial War Museum/Imperial War Museum/Imperial War Museum. **2300:** Imperial War Museum/Imperial War Museum. **(iv):** British Aerospace.

HOW TO OBTAIN ISSUES AND BINDERS FOR WAR MACHINE

Issues can be obtained by placing an order with your newsagent or direct from our Subscription Department. If you have difficulty obtaining any back issues from your newsagent, please write to us stating the issue(s) required and enclosing a cheque for the cover price of the issue(s).

AUSTRALIA please write to: Gordon and Gotch (Aus) Ltd, 114 William Street, PO Box 767G, Melbourne, Victoria 3001. MALTA, NEW ZEALAND, SINGAPORE & SOUTH AFRICA: Back numbers are available at cover price from your newsagent. In case of difficulty, write to the address given for binders.

UK/EIRE
ISSUE PRICE: 90p/IR£1.15
SUBSCRIPTION:
6 Months: £26.00
1 Year: £52.00
BINDER: Please send £3.95 per binder, or take advantage of our special offer in early issues.

EUROPE
ISSUE PRICE: 90p
SUBSCRIPTION:
6 Months air: £44.72
surface: £36.14
1 Year air: £89.44
surface: £72.28
BINDER: (inc. Postage)
air: £5.50
surface: £5.00

MALTA
Obtain BINDERS from
your newsagent or
Miller (Malta) Ltd,
MA Vassalli Street,
Valetta, Malta
Price: £3.95

MIDDLE EAST
ISSUE PRICE: 90p
SUBSCRIPTION:
6 Months air: £50.18
surface: £36.14
1 Year air: £100.36
surface: £72.28
BINDER: (inc. Postage)
air: £8.25
surface: £5.50

AMERICAS/ASIA/AFRICA
ISSUE PRICE: US$1.95/90p
SUBSCRIPTION:
6 Months air: £59.24
surface: £36.14
1 Year air: £119.08
surface: £72.28
BINDER: (inc. Postage)
air: £9.50
surface: £5.50

SOUTH AFRICA
ISSUE PRICE: SA R2.45
Obtain BINDERS from
any branch of Central
News Agency or
Intermag, PO Box
57394, Springfield 2137

SINGAPORE
ISSUE PRICE: Sing$4.50
Obtain BINDERS from
MPH Distributors
601 Sims Drive
03-07-21
Singapore 1438

AUSTRALASIA/FAR EAST
ISSUE PRICE: 90p
SUBSCRIPTION:
6 Months air: £64.22
surface: £36.14
1 Year air: £128.44
surface: £72.28

AUSTRALIA
ISSUE PRICE: AUS $2.15
Obtain BINDERS from
First Post Pty Ltd,
23 Chandos Street
St Leonards,
NSW 2065

NEW ZEALAND
ISSUE PRICE: NZ $2.65
Obtain BINDERS from
your newsagent or
Gordon & Gotch (NZ)
Ltd, PO Box 1595,
Wellington

ADDRESS FOR BINDERS AND BACK ISSUES
Orbis Publishing Limited
Orbis House
20-22 Bedfordbury
London
WC2N 4BT
Telephone: 01-379-5211

Cheques/Postal Orders should be made payable to Orbis Publishing Limited. Binder prices include postage and packing and prices are in sterling.

Back Issues are sold at the cover price, and we do not charge carriage in the UK.

NOTE
Binders and back issues are obtainable subject to availability of stocks. Whilst every attempt is made to keep the price of the issues and binders constant, the publishers reserve the right to increase the stated prices at any time when circumstances dictate. Binders depicted in this publication are those produced for the UK and Australian markets only. Binders and Issues may be subject to import duty and/or local taxes, which are not included in the above prices unless stated.

ADDRESS FOR SUBSCRIPTIONS
Orbis Publishing Limited
Hurst Farm
Baydon Road
Lambourne Woodlands
Newbury
Berks
RG16 7TW
Telephone: 0488-72666

All cheques/Postal Orders should be made payable to Orbis Publishing Limited. Postage and packaging is included in subscription rates, and prices are given in Sterling.

Field Guns of World War 1

Field artillery played a crucial role in shaping the course of World War I. The hail of shell produced by quick-fire field artillery helped force the armies on the Western Front to shelter in the trenches, where they remained until 1918. Lack of field guns gravely hampered the vast Russian armies, while aggressive artillery tactics were an important element in the Germans' success in the East.

A 60-pdr field gun is seen in action at Cape Helles during the Dardanelles campaign, July 1915. The large guns had to be manhandled into position, but once in place were invaluable due to their projectile weight and long range. This gun is at full recoil; note the dust kicked up by the muzzle blast.

During World War I field guns were the most numerous type of artillery in use. All of it had been developed and produced to take part in the fluid type of warfare that had been the norm during the previous century, in which large armies wheeled about the battlefields of Europe and the field artillery provided them with fire support. The conditions of warfare during World War I did not allow such artillery to behave in its accustomed mobile manner, for after a period in which it seemed that the old conditions of manoeuvre and open battle would prevail, it was not long before trench warfare set in all along the battlefronts.

The firepower of the new QF guns drove the infantry to take cover in trenches but it could not destroy earthworks. Only the howitzer could make any useful contribution, with its high angle of firing elevation and the near-vertical descent of its projectile. Only howitzers could reach out into the enemy trenches, and only the heavy howitzers could be of any real use. But the armies had large numbers of field guns and light field howitzers, so these had to be used. They could do but little against even the most lightly-protected defences, especially as during the early stages of World War I much of their ammunition was restricted to shrapnel intended for use against an enemy in the open. Shrapnel could not enter dug-outs or cut wire, so gradually it was replaced as a type by HE.

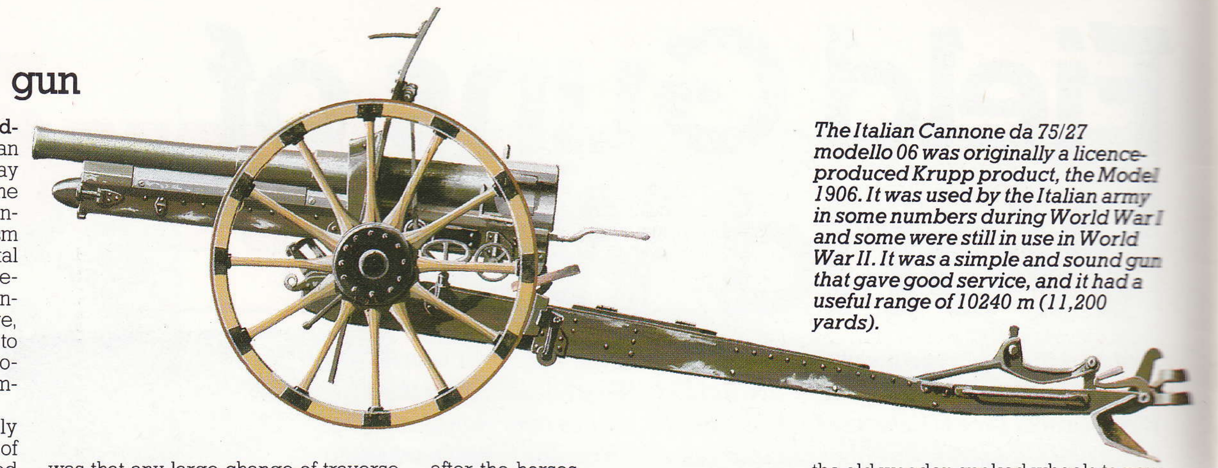
Why then was field artillery present in such quantity? The answer to that can be seen in production facilities and the continual search for some form of strategic breakthrough. Once that had been achieved the field guns could once more come into their own, whereupon the static and heavy siege guns that had gradually come into use along every battle front could be left behind. The production facility reference is explained by the fact that field artillery could be relatively easily manufactured in large quantities, while the production of heavier weapons took much more time and money. So field artillery it had to be for much of the time.

Not all World War I warfare was restricted to the trenches. In Russia, the Middle East and in the Balkans the fluid warfare envisaged by the pre-1914 military planners did take place, and here field artillery could play its proper role of supporting the other arms in the field. But the main theatre of World War I was the Western Front, and there the field artillery was massed to provide what support it could, and the gunners of all nations did their best.

A British Army 18-pdr field gun fires under typical Western Front conditions during the Battle of Pozières Ridge in late July 1916. The stack of spent cartridge cases gives an indication of the volume of fire that the gun was called on to produce day after day, testing the fitness of the gun and its crew.

ITALY

75-mm field gun


The Italian Cannone da 75/27 modello 06 was originally a licence-produced Krupp product, the Model 1906. It was used by the Italian army in some numbers during World War I and some were still in use in World War II. It was a simple and sound gun that gave good service, and it had a useful range of 10240 m (11,200 yards).

Although the **Cannone da 75/27 modello 11** was designed by a Frenchman it was produced only in Italy and may thus qualify as an Italian weapon. The designer was named Deport, who conceived the idea of a recoil mechanism that could stay fixed in a horizontal plane while the barrel could be elevated to any angle desired. The advantages of this system are rather obscure, but the Italian army certainly took to the idea to the extent that they produced the modello 11 in large numbers.

The modello 11 was a relatively small field piece, as a result mainly of the fact that it was originally ordered for cavalry use. In time it was issued to other arms and became a standard field gun. Apart from the unusual (an uncopied) recoil system, the modello 11 also had one other novel feature for its day. This was split trail legs which gave the gun an unusually wide traverse by contemporary standards, and also enabled the barrel to be elevated to a maximum of 65° allowing the gun to be used in mountainous areas if required. In action the trails were spread and instead of the more usual trail spade the legs were held in place by stakes hammered through slots at the end of each. This certainly held the gun steady for firing, but there were two disadvantages to this system. One was that any large change of traverse could not be made until the stakes had been laboriously removed from the ground; the other was that on rocky or hard ground it took time to hammer in the stakes. For all these potential troubles the Italians used the stake securing method on many of their artillery designs, large and small.

The modello 11 was a handy little weapon with a good range: its 10240-m (11200-yard) capability was well above that of many of its contemporaries. However, for its size it was rather heavy, which was no doubt a factor in its change from the cavalry to the field artillery. In action it had a crew of at least four men although a full detachment was six, the extra two looking after the horses.

It is known that some of these guns were used by the Italian maritime artillery militia within the Italian coastal defence organization. The modello 11s appear to have been used as light mobile batteries that could be used for close-in beach defences of likely landing spots. Many of the modello 11s were still in use in this role after 1940, and many other modello 11s were in service with the field artillery. In fact so many were still on hand in 1943 that many came under German control, with the designation **7.5-cm Feldkanone 244(i)**, for use by the German occupation forces in Italy. By that time many modello 11s had been modified for powered traction by conversion of the old wooden spoked wheels to new steel-spoked wheels and revised shields; these modernized equipments used pneumatic tyres.

Specification

Cannone da 75/27

Calibre: 75 mm (2.95 in)

Length: of barrel 2.132 m (83.93 in)

Weights: in action 1076 kg (2,372 lb); travelling 1900 kg (4,189 lb)

Elevation: − 15° to + 65°

Traverse: 52°

Muzzle velocity: 502 m (1,647 ft) per second

Maximum range: 10240 m (11,200 yards)

Shell weight: 6.35 kg (14 lb)

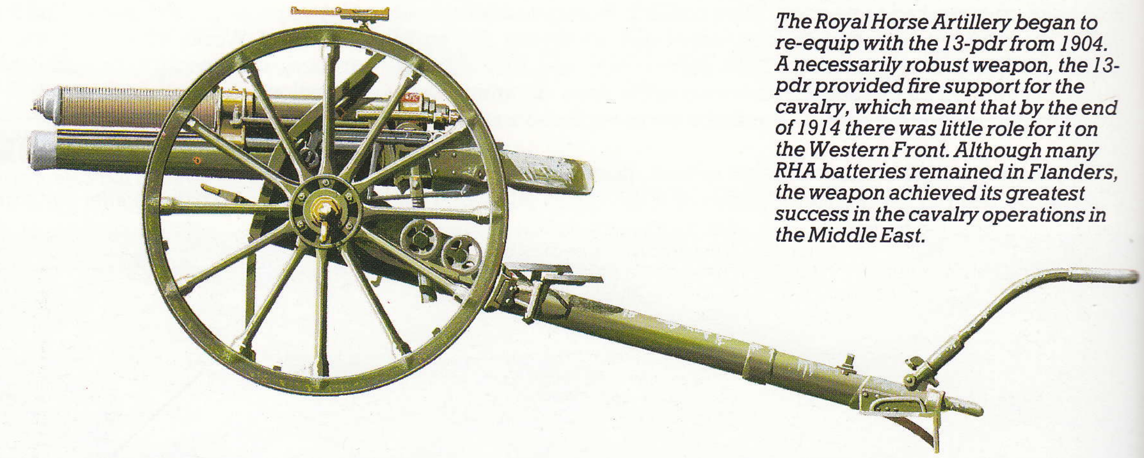
UK

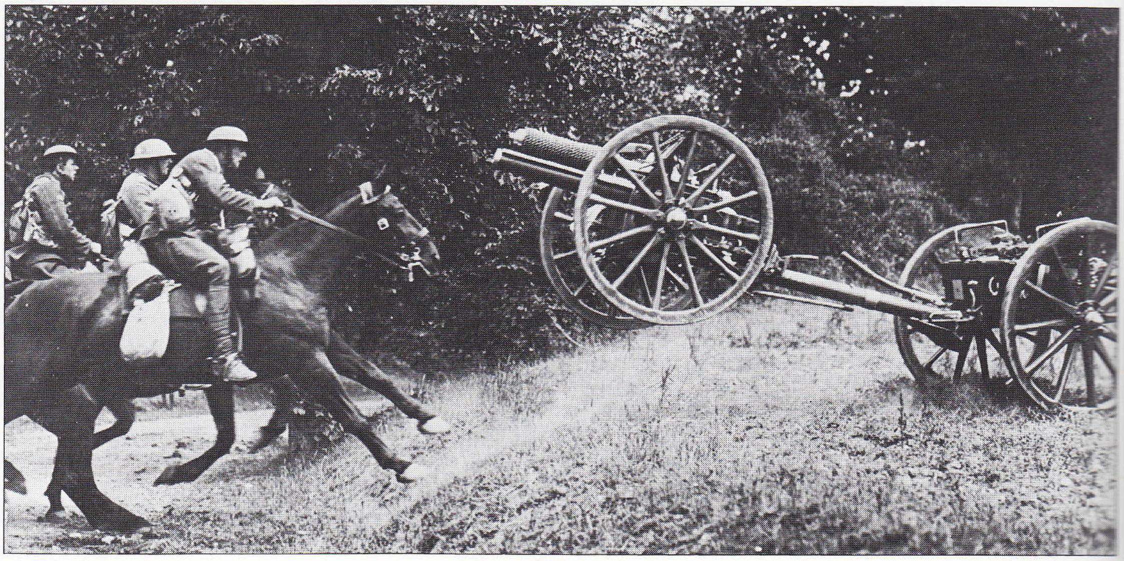
Ordnance, QF, 13-pdr Gun

In the aftermath of the Boer War the Royal Artillery decided that its ageing gun park was in great need of overhaul, and so launched a search for replacements. Field guns were one new type of equipment sought, but the final selection was difficult. The choice was between a design known as the **Ordnance, QF, 13-pdr Gun**, which was an amalgamation of the best features of Woolwich Arsenal and Vickers submissions, and the gun known as the Ordnance, QF, 18-pdr. Deliberations went on for some time before the decision was made to acquire the 13-pdr for the Royal Horse Artillery and the 18-pdr for the field regiments.

The first 13-pdr guns enterd service in 1904. The numbers of these weapons were never as great as those of the 18-pdr, for the Royal Horse Artillery was much smaller than the rest of the Royal Artillery. Some 13-pdr guns were sent to India, but most stayed in the United Kingdom, ready to move to France in 1914. It was a 13-pdr gun that fired the first British shot of World War I, and almost as soon as they arrived these guns were involved in the epic gunner battle of Nery. Thereafter the 13-pdr weapons were generally overshadowed by the 18-pdr guns, to the extent that at one point some 13-pdr pieces were withdrawn to be converted to rudimentary anti-aircraft guns.

The 13-pdr had a calibre of 76.2 mm (3 in), and in the light of Boer War experience much of the ammunition fired was shrapnel. This was not shrapnel as it is known today (fragments produced


The Royal Horse Artillery began to re-equip with the 13-pdr from 1904. A necessarily robust weapon, the 13-pdr provided fire support for the cavalry, which meant that by the end of 1914 there was little role for it on the Western Front. Although many RHA batteries remained in Flanders, the weapon achieved its greatest success in the cavalry operations in the Middle East.


The British 13-pdr (calibre 76.2 mm/ 3 in) was used by the RHA and was produced in far fewer numbers than the 18-pdr. The rope-bound tube over the barrel contained the hydro-spring recoil system.

by the detonation of the shell) but rather a form of carrier shell which contained a small explosive charge (detonated when the shell was still in the air) to blow out from the front of the shell a large number of lead or steel balls that spread out to act as anti-personnel weapons. Against an enemy in the open shrapnel was a very effective weapon, but against defended troops under cover it was virtually useless, and not much use at cutting through barbed wire. It took some time for appreciable amounts of high explosive shell to get to the gunners in France, so after the initial period of the war the 13-pdr guns were of only limited use in France. Instead many were sent to the Middle East where they were used in the various campaigns against the Turks.

Although not used in such large numbers as the 18-pdr, the 13-pdr was a good gun of its type and well suited to the horse artillery tactics of the era before World War I. The problem for the 13-pdr was that those tactics did not last long under the trench warfare conditions of World War I. But the design was basically sound, so sound that apart from the departure of some for use as anti-aircraft guns, the 13-pdr remained virtually unchanged throughout its service life. That service life is still not over, for the 13-pdr is still used by the King's Troop of the Royal Horse Artillery for its well-known ceremonial and display duties in London and elsewhere.

Incidentally, the shell fired by the 13-pounder did not weigh 13 lb (5.9 kg), but rather 12.5 lb (5.67 kg).

Specification

Ordnance, QF, 13-pdr Gun
Calibre: 76.2 mm (3 in)
Length: of barrel 1.86 m (73.25 in)
Weight: complete 1014 kg (2,236 lb)
Elevation: −5° to +16°
Traverse: 8°
Muzzle velocity: 511 m (1,675 ft) per second
Maximum range: 5395 m (5,900 yards)
Shell weight: 5.67 kg (12.5 lb)

This photograph, taken near Inexent in June 1918, shows exactly how robust horse-towed field guns had to be. The 13-pdr was light enough to be towed at speed by a six-horse team, and to this day 13-pdrs can still be seen towed by the King's Troop, Royal Horse Artillery, during their dramatic displays.

UK

Ordnance, QF, 15-pdr Gun

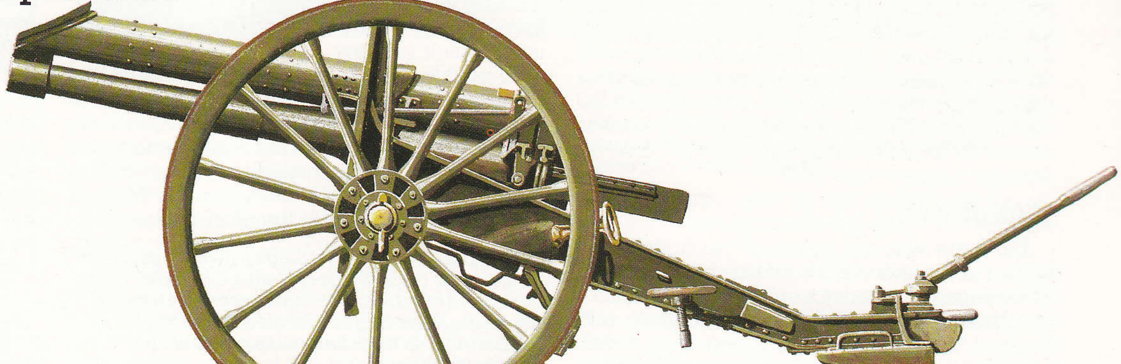
The **Ordnance, QF, 15-pdr Gun** should not be confused with the Erhardt 15-pdr field gun, which was a much more modern weapon than the British 15-pdr. The original British 15-pdr was a pre-Boer War piece that used the old system of a spring-loaded spade to absorb much of the firing recoil. This spade was under the axle and the main 'springing' came from a rope connected to a spring contained in a tube on the trail spade. This system worked, but it was cumbersome and inefficient, demanding a lot of work from the gun team. So in the aftermath of the Boer War, rather than simply dispose of the large numbers of guns in service, they were converted to take a hydro-spring recoil system over the barrel. The old 15-pdr breech was modified to a more modern form and other alterations were made. Once ready for use in 1907 they were issued to the Territorial Army batteries.

The 15-pdr was really too heavy for the field gun role and had an indifferent range capability, but it proved to be an excellent training weapon that could be provided at a relatively low cost. The new recoil system was efficient enough, but it was something of a fitter's headache as numerous marks of the old 15-pdr had been used for the conversions, and interchangeability of parts between guns was difficult.

The 15-pdr guns did not move to France until 1915, by which time the supply of 13-pdr and 18-pdr guns was becoming difficult. Only a few Territorial batteries took their 15-pdr equipments to France, but on arrival there was little they could do, for the only ammunition they had was shrapnel, which was of little use against a well dug-in enemy under top cover as was the case all along the Western Front by 1915. A few 15-pdr guns were present during the 1915 Battle of Loos, where they could add little to the proceedings as a result mainly of their lack of suitable projectiles.

After that brief flurry of activity the 15-pdr was retired to act as a training gun once more. A few were sent to South Africa, where they were used during some of the campaigns against the Germans in East Africa, but most of the rest were used to fire off their large stocks of ammunition as burst-producing delivery systems for the training of artillery observers, both on the ground and in the air. They continued in this role for a remarkably long time, for some Royal Artillery batteries in India were still using 15-pdr guns for this same purpose as late as the mid-1930s.

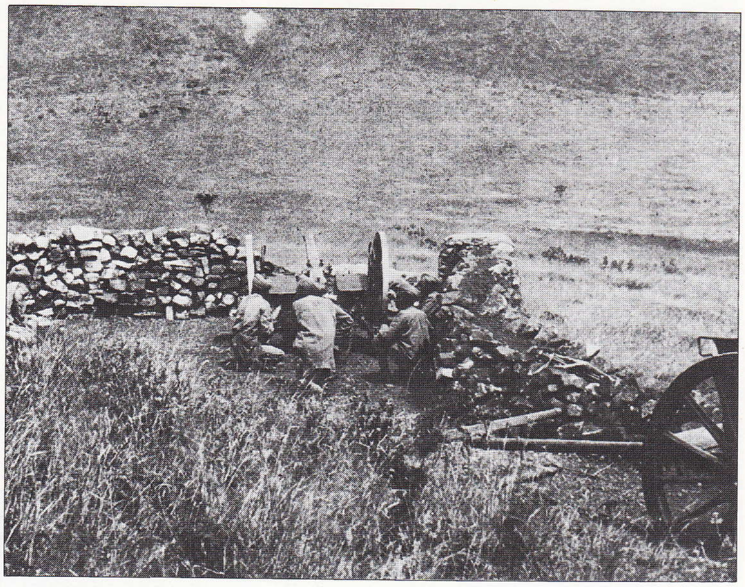
The 15-pdr is still one of the lesser-known guns of World War I, but it had its small part to play. It was certainly distinctive enough. The recoil system added to the weapon during the conversion from the original sprung spade configuration gave the gun a very distinctive appearance, as it was contained in a metal shroud that covered the entire upper length of the barrel.



Above: The 15-pdr field gun could trace its origins back to the 1890s, for it was an old field-gun design altered to use a new hydro-spring recoil system plus some other changes. The result was heavy and cumbersome, and by 1914 most were used by the Territorial Army who took them over to France in 1915. They were replaced as soon as possible.

Specification

Ordnance, QF, 15-pdr Gun
Calibre: 76.2 mm (3 in)
Length: of barrel 2.345 m (92.35 in)
Weight: complete 1339.5 kg (2,953 lb)
Elevation: −9° to +16°
Traverse: none
Muzzle velocity: 484 m (1,590 ft) per second
Maximum range: 5258 m (5,750 yards)
Shell weight: 6.35 kg (14 lb)



The original 15-pdr the World War I field gun evolved from was still employed by the Indian Army in 1914, who used them during some of the early campaigns in German East Africa. This example is seen firing during a training camp exercise in India in July 1915.

The Battle of Neuve Chapelle

By Christmas 1914 the armies on the Western Front found themselves in a line of trenches stretching from the Channel coast to Switzerland: it was siege warfare on a continental scale. The first attempt to break the deadlock was launched by the British Expeditionary Force in March 1915 in the form of a limited offensive aimed towards the town of Lille.

The high hopes with which Europe went to war in 1914 had largely evaporated by the end of that year. No one was going to be 'home for Christmas' after all, and no one in the immediately foreseeable future was going to hold any triumphant victory parades, for the war on the Western Front was set into an apparent stalemate, though neither of the high commands was prepared to accept this as anything but a temporary situation.

But how to break it?

The British in particular were unhappy about it all; unhappy because their famous cavalry was unoccupied, unhappy because none of their vast experience of warfare gained on every frontier of their empire (especially those of India) seemed relevant in these dank and muddy conditions, and especially unhappy because a fundamental axiom of British military life (that British soldiers and especially their officers all possessed an innate 'eye for country') was totally nullified here. The British sector of the line ran a twisting 45 km (28 miles) from a point near Ypres in the north down to the area of La Bassée through ground as flat as a plate, with visibility rarely over 100 m (110 yards), and what little raised ground there was was in the hands of the enemy. A fat lot of use an 'eye for country' was here.

High ground

But there was one sector of the British front where, if the stalemate could be broken, great advantage might accrue. Opposite this sector lay the small village of Neuve Chappelle, and beyond it lay the Aubers Ridge from which good observation (and indeed command) could be obtained of the town of Lille, that essential focus for the great breakout which would sweep the Germans back out of Belgium and behind their own frontiers.

Here, certainly, an attack might be mounted. At the very least an advance up Aubers Ridge would get General Sir Douglas Haig's 1st Army out of the sodden, waterlogged mud where it had spent the last weeks, and up into drier and thus more comfortable conditions.

Planning the offensive

Preparations began in the last days of February 1915, and ran immediately into unforeseen problems. It had become accepted that the generals would have to command in the field far larger armies than ever before, and now the staffs were finding themselves confronted with tasks of far greater magnitude and complexity than either they or their instructors had ever envisaged. Moreover, this offensive was to be the first ever launched from a trench system; there was no previous experience of any kind upon which to draw.

At least there was going to be no shortage of either men or matériel. Three whole brigades (the 23rd and 25th Brigades, and the Garhwal Brigade of the Indian Corps) were being made available, to crash through a mere 2745 m (3,000 yards) of trench between the 'Moated Grange' on the left and the 'Port Arthur' crossroads on the right, and according to intelligence there would be reinforcements of only 4,000 German rifles by the end of the day that the attack was launched, plus 12,000 more only by the end of the second day. The German front-line strength at the time of the assault was some 1,400 rifles.

Even more important, artillery was to be used on a scale hitherto unimagined, working to a timetable giving each battery a definite task, and with specific targets for each phase of

This photograph tells more than mere words how dreadful the conditions in the trenches were by March 1915. Even simple tasks such as writing home were turned by the mud and cold into a major operation.

A 6-in (152.4-mm) 30-cwt Siege Howitzer registers its fire prior to the Battle of Neuve Chapelle. These heavy and cumbersome howitzers were used by the single Siege Brigade formed by the Royal Artillery at that time, and had a range of only 4755 m (5,200 yards).

the bombardment. This was in itself a new departure, but even more innovatory was the decision to use in front of the advancing infantry a 'creeping barrage', which would lift to more distant targets as the infantry approached. This was an experiment which would be watched carefully by gunners everywhere.

The entire artillery of two corps was secretly moved into position and most guns had begun a carefully-controlled registration programme by 5 March, 340 guns altogther, including batteries of 119-, 152- and 233-mm (4.7-, 6- and 9.2-in) weapons at the rear, and 119-, 152- and 233-mm howitzer batteries at the front. Two more 152.4-mm howitzer batteries arrived on 9 March and were fitted into position in the northern half of the attack line, and the fact that they had no time for registering or even practising their main task (the cutting of enemy wire to their front) did not particularly worry the Scottish Rifles or the Middlesex battalion about to go over the top in front of them.

Dawn attack

By 04.00 on the raw, damp morning of 10 March all the assaulting infantry was in position: the 2nd Middlesex, 2nd Scottish Rifles, 2nd Lincolnshires, 2nd Royal Berks and the Garhwalis, with behind them in immeditate support the 2nd West Yorks, 2nd Devons, 1st Royal Irish Rifles, 2nd Rifle Brigade, and 1st Seaforth Highlanders with the Indians; and the 5th Cavalry Brigade waited impatiently at GHQ for the magic word that the breakthrough was open for them to sweep through and exploit.

The waiting men were cold, though they had had a hot meal during the night, and now they were keyed up with excitement and enthusiasm.

Artillery barrage

A few ranging shots went over between 06.00 and 07.15, there was a brief pause, and then at 07.30 opened the loudest and heaviest bombardment any of them had ever experienced. The air above was filled with the roar and scream of passing shells, the known German positions in front erupted in gouts of mud and earth, and stakes flew through the air trailing masses of wire, occasionally laden with gruesome remnants of bodies; and back towards the British lines drifted the thick, sickening fumes of Lyddite explosive. The whole earth quivered momentarily as in an earthquake, then the bombardment steadied, the barrage lifted from the German trenches opposite to the village of Neuve Chapelle itself, and the men clambered out of their trenches and went forward.

Early success

On the right, the Garhwalis reached the lines opposite with very little trouble, although their right-hand companies had veered too far right and left a gap to be plugged by the Seaforths behind them; on their left the Berkshire and and Lincolnshire men were into the German trenches by 08.20, and the Rifle Brigade and the Royal Irish Rifles came through and stormed straight on into the village as the barrage lifted to the far side. Everywhere they found German troops dazed and shocked by the bombardment, hardly able to comprehend the situation, let alone offer resistance; by 09.00 nearly 300 prisoners had been shepherded back. A few survivors were seen making their way towards some woodlands behind the village.

A German gunner peers into the sights of a 21-cm (8.26-in) howitzer. The Germans had a powerful siege park which made short work of the Belgian forts but was initially inadequate to defeat extensive trench systems.

On the left, however, the Middlesex had been shot to pieces. The newly arrived howitzers had failed to cut the wire in front of them, the defending company of a Jäger battalion was virtually unscathed and its machine-guns had annihilated the leading Middlesex waves, enfilading the Scottsh Rifles next to the Middlesex and blocking the entire assault.

British reaction was remarkably quick: at 09.40 a second bombardment was ordered opposite the Middlesex position, and this proved exceeding accurate and efficient; as the second wave of the Middlesex attack began, an officer and 60 men of the Jägers climbed out of their trenches and walked forward to give themselves up! By noon all initial objectives of the attack had been achieved and visions of reaching the commanding heights of Aubers Ridge beckoned; the support troops moved up, the whole of the 7th Division to the north was alerted, and the 5th Cavalry Brigade moved to Estaires, 9.7 km (6 miles) north.

But now the problems of communication made themselves felt, for runners and message pads were still the chief means: it was five hours before the next advance could be mounted, five hours in which the Germans had moved reserves up into their second defence lines, had resited their machine-guns and buttressed the more obvious of their weak points. And now the British infantry were moving through thickening dusk into wet and muddy country of which they knew nothing, and into which their artillery could no longer drop preplanned and accurately-registered cover.

There were no successful advances during that evening, and by morning the Germans had had even longer to strengthen their defences, bring up more reserves and even plan a counterattack. This, however, was beaten off on the morning of 12 March, for the British and Indians had also been working on the defences in their new positions, and by that evening it was obvious that the stalemate was back. So the battle ceased.

The British had lost 583 officers and 12,309 other ranks, and the Germans approximately the same numbers, of whom 1,687 had been taken prisoner. The area of ground newly in British hands measured about 3660 m by 915 m (4,000 yards by 1,000 yards) deep, and most of it had been captured during the first three hours. It was, in fact, almost exactly the area covered by that first, meticulously-planned artillery schedule.

The day of the Master-Gunner had dawned.

This wrecked machine-gun position was only destroyed in the second bombardment after it exacted a heavy toll of the attacking infantry, but all too often the machine-guns and gunners survived to wreak havoc against the advancing British battalions.

UK

Ordnance, QF, 18-pdr Gun

The first **Ordnance, QF, 18-pdr gun Mk I** was issued to the Royal Artillery in 1904, and in the years after that it was also issued to many other Commonwealth armies, so that by 1914 the 18-pdr was the standard field gun of the British and Commonwealth armies; some were even being produced in India. The 18-pdr had no single parentage, but was an amalgam of design ideas produced by Woolwich Arsenal, the Elswick Works and Vickers. The barrel was wire-wound, had a simple single-action breech, and was mounted on a pole trail carriage. The usual shield was fitted, and as was common at that time the ammunition fired was almost entirely shrapnel.

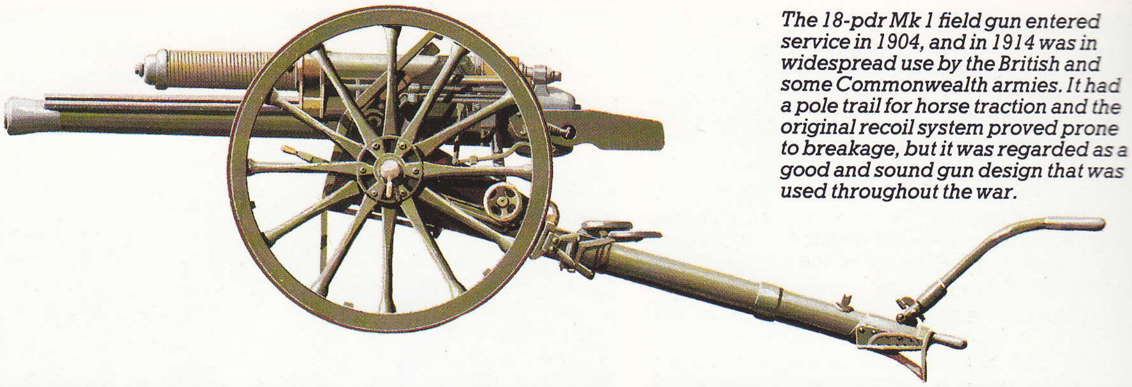
It was not long before the original design was being modified. The first change was to allow a barrel liner to be replaced when worn, but when the 18-pdr went to war in 1914 it was still basically the same as it was when first issued. The trials of battle soon highlighted what was to become known as the 18-pdr's weakest point: the recuperator springs, which returned the barrel back to the firing position after recoil, could not put up with the stresses that continued firing produced and broke under the strain, leaving the gun useless. At first all the gun fitters could do was keep changing the springs, a hazardous and time-consuming operation until a modification that could be adopted in the field was developed. This was an entirely new hydropneumatic recoil system that fitted inside the existing spring housings: this did the trick and the 18-pdr became much more reliable.

However, the 18-pdr was to undergo one more major change during World War I. The original carriage used a pole trail which was useful enough for horse traction, but as it went right under the breech it limited elevation angles, and thus range. This led to what became known as the **18-pdr Gun Mk IV** (the other marks were development models, apart from the original Mk I). This was virtually a new design: for a start the Mk IV was fitted with a box trail which allowed the barrel to be elevated much further to provide the required range increase, the breech mechanism was changed to a new form known as the Asbury type, and the recoil system was moved to an entirely new position under the barrel. The new recoil system used a 'floating piston' that employed oil and compressed air to provide a much smoother and more reliable movement. The cradle was redesigned to take the loads imposed by these new features, and the result was a much better all-round gun. Not only did it have a far better range, but it was far more stable in action and proved to be capable of very high rates of fire: 30 rounds a minute in the hands of a well-trained team was not unusual.

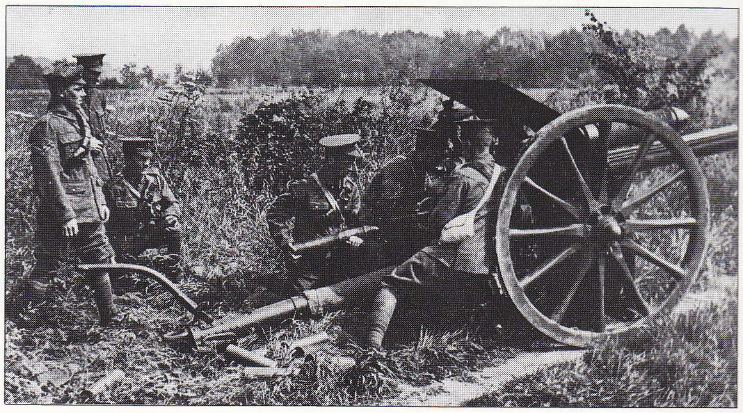
The 18-pdr Mk IV was just getting into full production as the war ended, and it became the preferred weapon of the Royal Artillery in the inter-war years. By then the 18-pdr was in use outside the British and Commonwealth armies. The US Army had taken over large numbers commencing in 1917, and other nations that later used the 18-pdr were Ireland, some of the Baltic States and China. Many 18-pdr guns were used during World War II and the last of the type did not leave Irish service until the 1970s.

Specification

Ordnance, QF, 18-pdr Gun Mk I
Calibre: 83.8 mm (3.3 in)
Length: of barrel 2.463 m (96.96 in)
Weight: complete 1280 kg (2,821 lb)
Elevation: $-5°$ to $+16°$
Traverse: 8°
Muzzle velocity: 492 m (1,615 ft) per second
Maximum range: 5966 m (6,525 yards)
Shell weight: 8.39 kg (18.5 lb)



The 18-pdr Mk 1 field gun entered service in 1904, and in 1914 was in widespread use by the British and some Commonwealth armies. It had a pole trail for horse traction and the original recoil system proved prone to breakage, but it was regarded as a good and sound gun design that was used throughout the war.



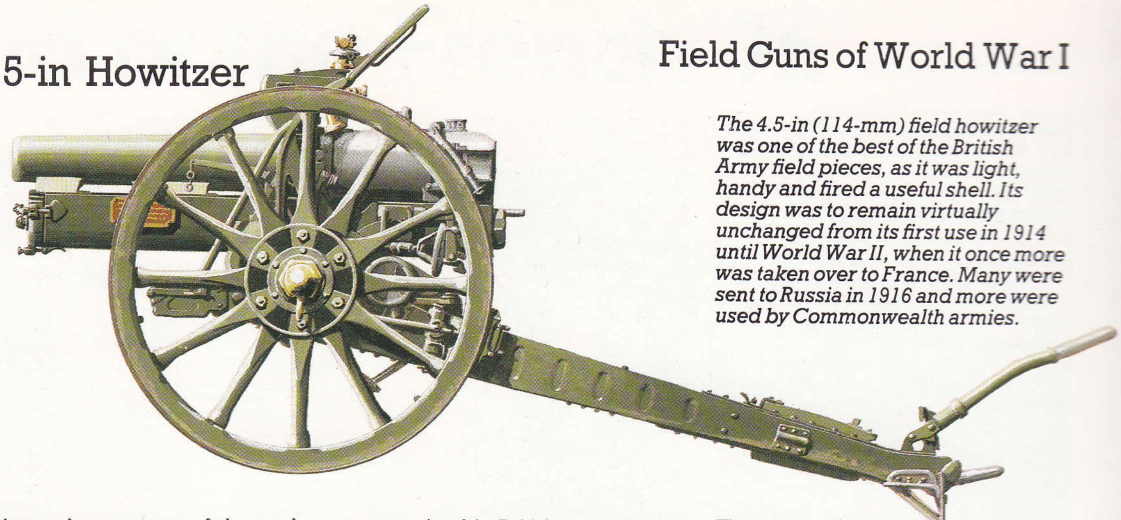
Right: An 18-pdr (calibre 83 mm/ 3.3 in) is seen in action near St Leger aux Bois in the Oise region during August 1916. The pole trail is clearly visible, as is the one-piece round that was almost the same size as one of the old quart beer bottles.

Right: 18-pdr field guns come into action in a remarkably open fire position during the Battle of Thiepval Ridge in September 1916. The gun off the road to the rear is ready for action, while the team in the foreground is just about to drag off an empty ammunition limber.

An 18-pdr is manhandled from a waterlogged gun position near Zillebeke during the Flanders offensive of August 1917, providing a graphic indication of why that offensive failed to achieve anything and got bogged down.

UK

Ordnance, QF, 4.5-in Howitzer



The 4.5-in (114-mm) field howitzer was one of the best of the British Army field pieces, as it was light, handy and fired a useful shell. Its design was to remain virtually unchanged from its first use in 1914 until World War II, when it once more was taken over to France. Many were sent to Russia in 1916 and more were used by Commonwealth armies.

The **Ordnance, QF, 4.5-in Howitzer** used by the British army throughout World War I was another weapon developed in the aftermath of the Boer War. During that colonial conflict the Royal Artillery learned the hard way that its field howitzers were too heavy, too slow in action and generally too cumbersome, so they asked for something better. For some reason the usual state arsenals were asked to submit their new designs at the same time as private manufacturers, and in the end a private manufacturer, the Coventry Ordnance Works, was awarded the contract.

This welcome change from what had up till then been a virtual state monopoly meant that when the BEF went to France in 1914 it took what was then thought to be the best field howitzer in the world. It was able to outperform all its contemporaries, and yet was handy enough to operate alongside the 18-pdr guns in a normal field artillery regiment. This result was achieved mainly by making the basic design simple and robust, and the weapon was so sound it required only one modification throughout its long service life: the rounding off of some of the sharper corners of the breech mechanism to prevent cracking after prolonged firing. As with the 18-pdr the 4.5-in (114.3-in) howitzer was also issued to many Commonwealth armies including those of Canada, Australia and New Zealand. During the war the 4.5-in howitzer was also passed on to Russia, as by 1916 the Tsarist armies were in a rather poor state, and the British government handed over 400 4.5-in howitzers. These were destined to have an eventful life, for they took part in the Russian defeats of 1917, and also played their part in the events surrounding the revolutions of 1917 and the subsequent civil war. Many were still on hand when the Germans invaded in 1941, captured examples being designated **11.4-cm leichte Feldhaubitze 363(r)**.

During World War I the 4.5-in howitzer was towed into action by a team of six horses. The full gun team was 10 men although fewer actually served the gun in action, the rest acting as ammunition and horse handlers. In common with most other weapons of the period the 4.5-in howitzer was supposed to make great use of shrapnel, but high explosive was soon found to be much more useful, though it was in short supply in 1914 and 1915, a shortage that lead to a political storm known as the 'shell scandal'. The ammunition also featured in another political uproar, this time after World War I, for the fuses used on the shells were a clockwork type first produced by Krupp in Germany. After the war Krupp took the British government to an international court to extract royalties due on every fuse fired, and won the judgement!

By the time World War I ended, 3,177 4.5-in howitzers had been produced in addition to the 182 completed before 1914. After 1918 these howitzers were retained in British army service to be used again during the early campaigns of World War II. By then their original wooden spoked wheels had been replaced by new items with pneumatic tyres for powered traction. The Germans used 96 captured equipments in the Atlantic Wall with the designation **11.4-cm leFH 361(e)**. The last 4.5-in howitzers to be used as service weapons were those of the Irish army, the final examples not retired until the late 1970s.

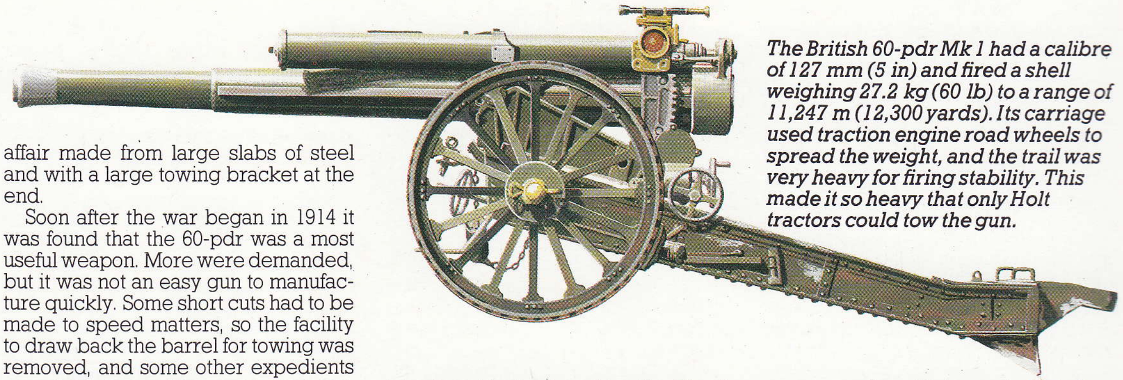
Specification

Ordnance, QF, 4.5-in Howitzer
Calibre: 114.3 mm (4.5 in)
Length: of barrel 1.778 m (70 in)
Weight: complete 1365 kg (3,010 lb)
Elevation: −5° to +45°
Traverse: 6°
Muzzle velocity: 308 m (1,010 ft) per second
Maximum range: 6675 m (7,300 yards)
Shell weight: 15.876 kg (35 lb)

An Australian battery of 4.5-in (114-mm) field howitzers are seen in action during the open warfare of late August 1918, somewhere near Hamel. The high elevation of the short barrels enabled their shells to fall almost vertically into enemy earthworks.

UK

BL, 60-pdr



The British 60-pdr Mk 1 had a calibre of 127 mm (5 in) and fired a shell weighing 27.2 kg (60 lb) to a range of 11,247 m (12,300 yards). Its carriage used traction engine road wheels to spread the weight, and the trail was very heavy for firing stability. This made it so heavy that only Holt tractors could tow the gun.

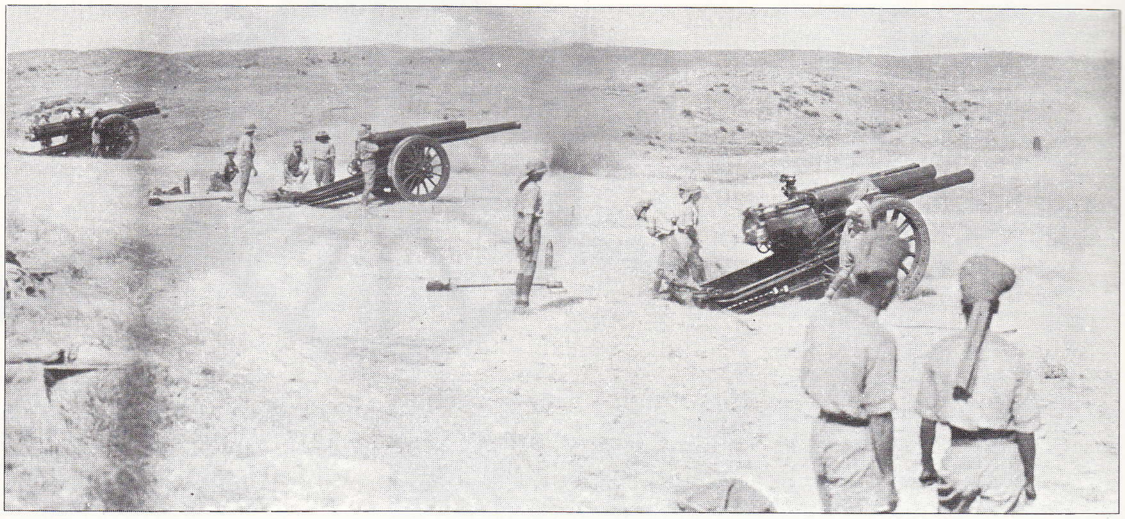
During the Boer War some 4.7-in (119-mm) naval guns were converted to the field role, and these provided the Royal Artillery with an idea of what they would need in the future. From this example the Royal Artillery gunners asked for a long-range gun firing a shell weighing 27.2 kg (60 lb) for use by divisional heavy batteries, and the Elswick Ordnance Company was asked to produce a design, the first example of which was accepted.

This gun became known as the **BL, 60-pdr Mk I**, and it was a large and handsome gun with a long barrel, two prominent recoil cylinders over the barrel, and a heavy trail. In order to make the gun more manageable the barrel could be drawn back over the carriage for towing, and the large wheels were based on traction engine wheel designs to help spread the loads over soft ground. The trail was a heavy affair made from large slabs of steel and with a large towing bracket at the end.

Soon after the war began in 1914 it was found that the 60-pdr was a most useful weapon. More were demanded, but it was not an easy gun to manufacture quickly. Some short cuts had to be made to speed matters, so the facility to draw back the barrel for towing was removed, and some other expedients were introduced. The result was a carriage that was heavier, but at least more equipments could be sent to France. There it was soon discovered that trying to move these large guns around with horse teams was an almost impossible task, so Holt tractors were introduced instead, making the 60-pdr one of the first British weapons of its kind to be towed by powered traction. But even with the Holt tractor the Mk II carriage with its fixed barrel was a cumbersome load, leading to the Mk III carriage in which the barrel could once more be withdrawn, but this time the method used was much simpler: the barrel was disconnected from the recoil mechanism and pulled back.

The 60-pdr was initially supplied mainly with shrapnel shell, but this was changed to high explosive once trench warfare had set in. Thereafter, wherever the British army went the 60-pdr went with it, from France to Mesopotamia. The 60-pdr gave sterling service, although it was always a brute to move, but in action it was steady, reliable and accurate. New streamlined shells were provided to increase range, but the only real long-term answer to producing even more range was to develop a new gun. This duly appeared during the last few months of World War I in the shape of the **BL, 60-pdr Mk II**, which introduced a new type of carriage and recoil system, a longer barrel and many other detail changes. None of these 60-pdr Mk II guns was in service before the war ended.

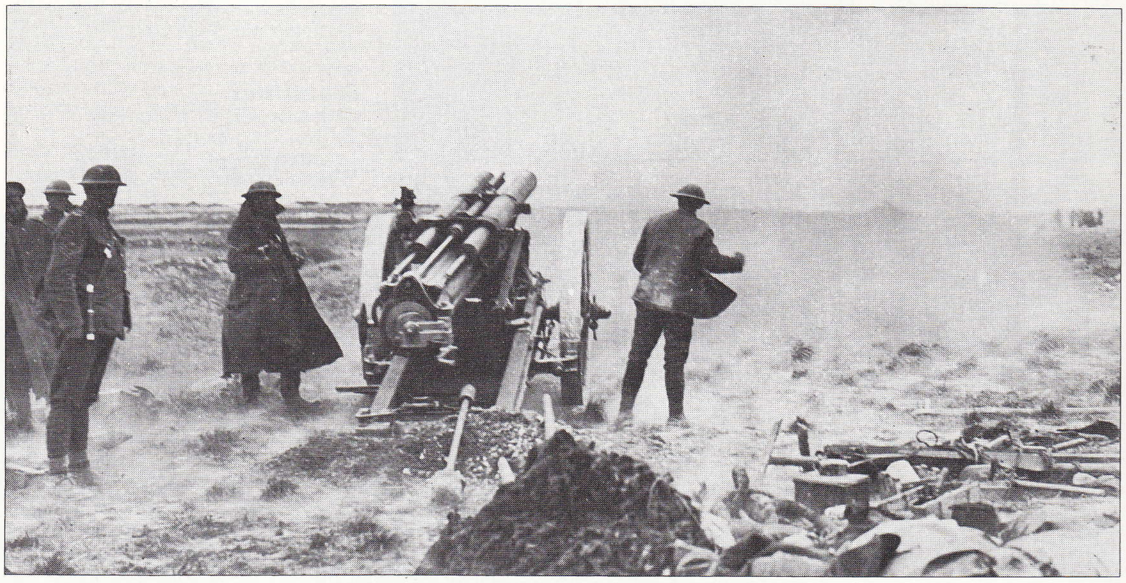
Along the Western Front the 60-pdr guns were used mainly for counterbattery work or for demolishing strongpoints. They were also used at times for what is now known as harassing fire, i.e. firing off odd rounds deep into the enemy rear to land around road junctions, railway stations etc. generally to disturb the enemy's movements. To do this effectively the guns had to be moved up to close behind the front lines, no easy task in view of the bulk of the 60-pdr.



Above: 60-pdrs fire at Turkish positions near Samarra in 1918. These guns have Mk 3 carriages, which were much lighter than the previous marks using traction engine wheels. Recognition features of the 60-pdr were the two recoil cylinders over the long barrel and the large and heavy carriage trail.

Specification

BL, 60-pdr Mk I on Carriage Mk III
Calibre: 127 mm (5 in)
Length: of barrel 4.268 m (168.05 in)
Weight: complete 4470 kg (9,856 lb)
Elevation: −5° to +21.5°
Traverse: 8°
Muzzle velocity: 634 m (2,080 ft) per second
Maximum range: 11247 m (12,300 yards)
Shell weight: 27.2 kg (60 lb)



A 60-pdr fires near La Boiselle in March 1918. These guns had a range that allowed them to be sited well back from the trench lines and thus needed digging in only during long spells in one position.

FRANCE

Canon de 75 mle 1897

The claim to being one of the most famous guns of all time can be truly made by the French '75', the well-known 'soixante-quinze' or **Canon de 75 mle 1897**. Over the years this gun earned for itself an almost legendary reputation, but in historical terms it deserves fame as being one of the first true quick-firing guns. This was achieved by the introduction of a novel hydraulic recoil system that rendered contemporary mechanisms (based upon the use of springs alone) virtually obsolete overnight. This mechanism, allied to the introduction of the Nordenfeld breech mechanism that could be opened and closed by the flick of a lever, enabled the '75' to fire shells at rates of up to 28 rounds per minute, which in its day was truly revolutionary.

The '75' was a government design first produced at the Atelier de Bourges, but it was not long before the type was being made elsewhere, especially by Schneider & Cie at Le Creusot. This company's production was so prolific that the design was sometimes attributed to Schneider. The first models appeared in 1897 (hence mle 1897) and were kept under wraps for a considerable time as they were regarded as highly secret weapons. Much was expected of them, for they were seen as the main support weapons for the French doctrine of the attack, in which the offensive spirit was supposed to overcome any opposition. The high fire rate of the '75' was intended to overcome the relatively light weight of HE shell fired, 6.195 kg (13.66 lb). This doctrine was to cost the French army dearly in 1914, but throughout the 'Great War' the '75' remained the standard field piece of the French army.

The hydraulic recoil system of the '75' produced a relatively long recoil action, so long in fact that two 'ears' were fitted under the muzzle to engage lugs on the recoil housing at full travel to take some of the barrel loads off the pistons. These 'ears' provided the '75' with an easy recognition feature. The breech mechanism used a simple lever and interrupted-thread action that was swiftly and easily operated to allow the one-piece ammunition to be fed into the chamber. A box-section pole trail was used, limiting the maximum angle of elevation and consequently the range, but this undesirable feature was not rectified until well after World War I. Many '75s' had a fuse-setting machine fixed to the trail leg when in action.

The '75' was produced in thousands during World War I, and it was issued to armies other than the French. The US Army adopted the type in 1917 and even commenced production of its own version. So many '75s' were produced that they were used for a variety of other purposes. The armament of the first French tanks was the '75', and the '75' was also used as an anti-aircraft gun, either mounted on some dreadful lash-ups involving metal frames or on self-propelled mountings on de Dion lorries. Some were used as coastal defence weapons and when a 37-mm (1.456-in) trench gun was required in 1916 the result was a half-scale '75'.

The '75' went on to a long post-war career after 1918, and was later produced in some strange guises, but it is as one of the most widely-used guns of World War I that the '75' will be best remembered. Examples used by the Germans in World War II were designated **7.5-cm Feldkanone 231(f)**, but a more common name was **7.5-cm FK97(f)**.

Specification

Canon de 75 mle 1897
Calibre: 75 mm (2.95 in)
Length: of barrel 2.587 m (101.85 in)
Weights: in action 1140 kg (2,514 lb); travelling 1970 kg (4,343 lb)
Elevation: −11° to +18°
Traverse: 6°
Muzzle velocity: 575 m (1,886 ft) per second
Maximum range: 11000 m (12,030 yards)
Shell weight: 6.195 kg (13.66 lb)

The Legend of the French '75'

The '75' was the pride of the pre-war French army. A truly innovative weapon, it completely outclassed the field guns of all other armies when it was introduced at the turn of the century. The secrecy surrounding its design and development endowed the gun with a mystique that was to prove enduring, and the soixante-quinze gave sterling service.

The gun that was to become internationally-known as the '75' had its origins in a French army project of the 1890s. By that time the breech-loading gun was commonplace, but it suffered from the factor that had affected artillery weapons ever since black-powder days: when a gun was fired the recoil forces forced the gun barrel and carriage back out of position, and they had to be replaced before another round could be fired. If some method of absorbing this recoil could be found, rapid rates of fire would be possible as there would be no need to keep manhandling the guns back to their firing position after every shot. The solution seemed to lie in the field of hydraulics, for a German firm had developed a way of making a piston attached to the barrel move through a thick fluid as it recoiled, and by careful design this absorbed the recoil forces. This principle was applied to some large static coastal guns, but to make the idea work on a much smaller and lighter field gun was another matter. Most of the major European powers set their designers to work on the problem, but the French found the answer first.

The French solution was a simple extension of the original German piston and fluid idea; they simply made it smaller and with holes in the piston so that a mixture of water and glycerine could pass through the holes at a set but slow rate. This would absorb recoil forces to the extent that none, or virtually none, would be passed to the carriage. Thus the mle 1897 was born and the French army immediately put a strict security clamp on it. No one outside the immediate circle of user gunners was allowed even to see the weapon, and not even the gunners had any real idea of how the recoil system actually worked.

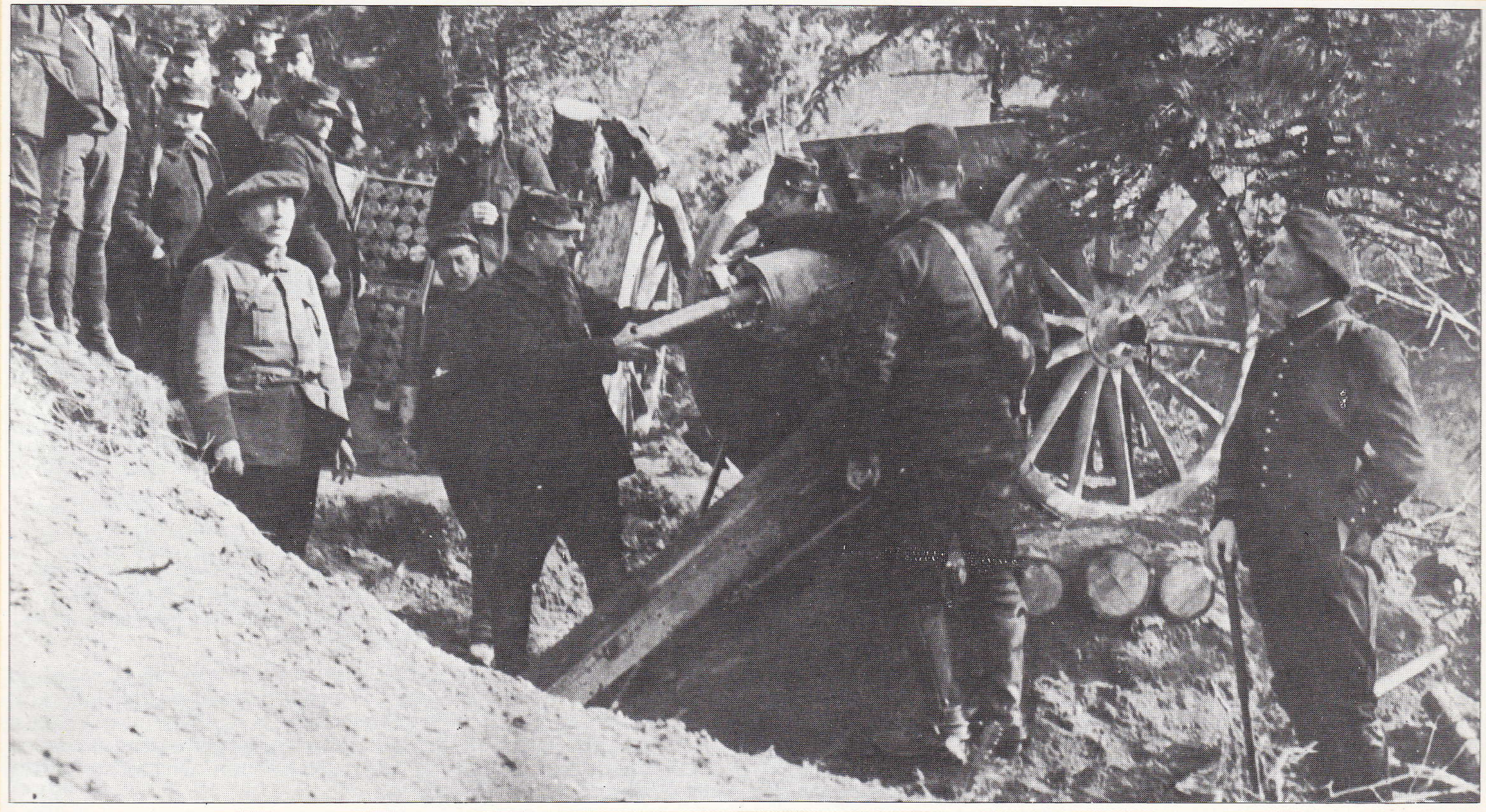
Unfortunately for the French army, this desperate secrecy attracted attention and it was not long before the workings of the recoil system were out. By that time the other major European powers had decided that if the French were to have a new quick-firing weapon with an efficient recoil system, then they had to have one as well. Thus their designers duly came up with other but basically similar solutions. Some of these solutions were even better than that of the mle 1897, for to ensure that the French system worked efficiently the barrel had to recoil a considerable distance, some 1.22 m (48 in). This made the barrel move so far that the centre of gravity and thus carriage stability could be affected, and the stresses on the recoil cylinder piston rods were so considerable that 'ears', engaging in lugs under the recoil housing, had to be fitted under the muzzle to take some of the strain. This did not materially affect the rate of fire of the mle 1897, which could be as high as 28 rounds per minute with a trained crew. The barrel used a Nordenfeld breech mechanism that could be rapidly opened using a simple lever and a flick of a trained wrist, and the ammunition was loaded in one piece, shell and propellant case joined together.

By the time 1914 arrived the general secret of the mle 1897 was well known, although the French still retained some security restraints on the internal details. The French army expected great things of the '75', for it exactly suited their philosophy of the attack. In this view any enemy would simply be swept away by massed infantry attacks with batteries of '75s' producing vast supporting barrages at high rates of fire. The relatively light shell weight was overlooked, it being stated that high fire rates would overcome that slight problem. Thus when the French infantry advanced to the Battles of the Frontiers in August 1914, they advanced in front of massed batteries of '75s' firing over open sights at the German enemy.

The Battles of the Frontiers soon showed that French ideas on the strength of the attack were of no avail in the face of machine-guns, magazine loading rifles and well-concealed enemy artillery. The '75s' did indeed prove to be very useful and handy weapons, but their overall

The 75-mm (2.95-in) mle 1897 was also used as an anti-aircraft gun on both fixed and mobile mountings, as seen here. This mobile gun is manned by newly-arrived US Army gunners who took over a great deal of French and British equipment once they arrived, as they had little of their own at that time.

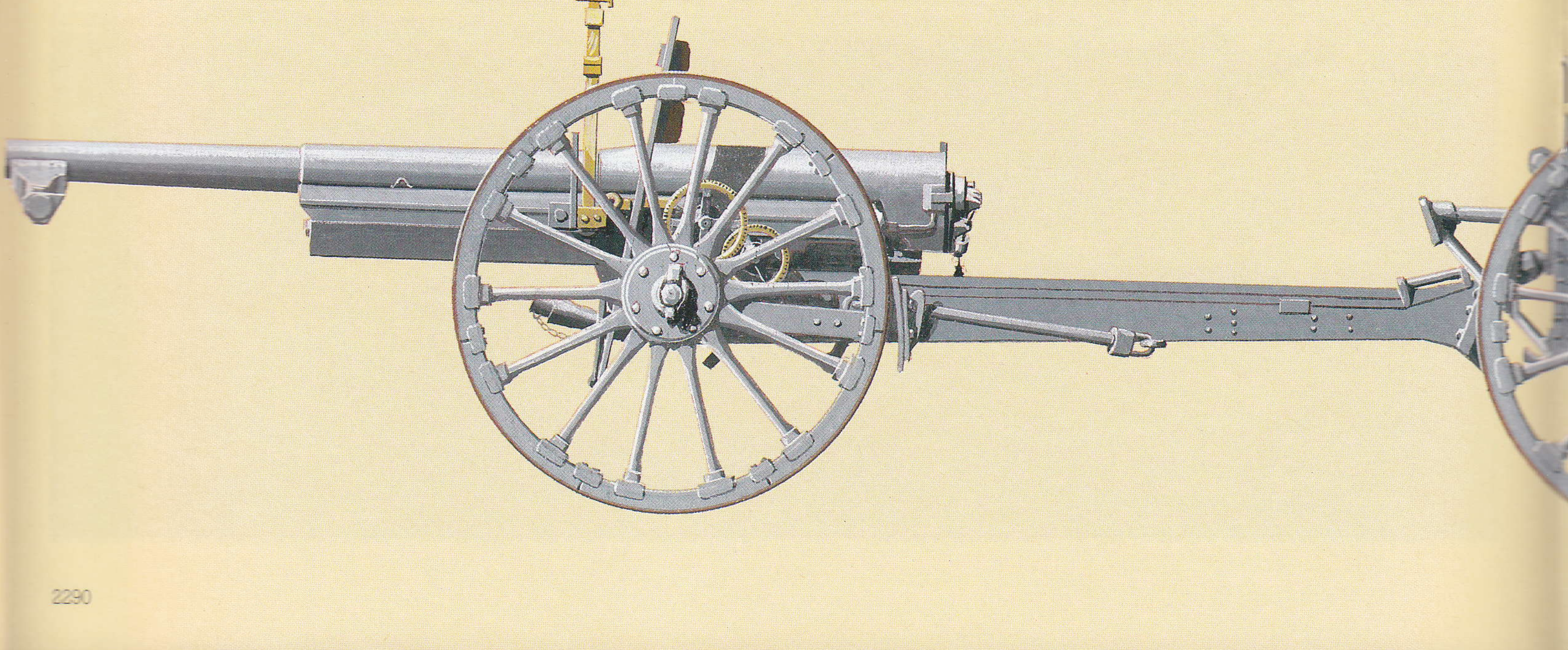
British gunners watch a French battery firing their 75-mm (2.95-in) mle 1897 field guns near Domart, April 1918. The '75s' had a high rate of fire, but their light shells could do little more than scrape the ground surface from the terrain and help create the Western Front landscape.

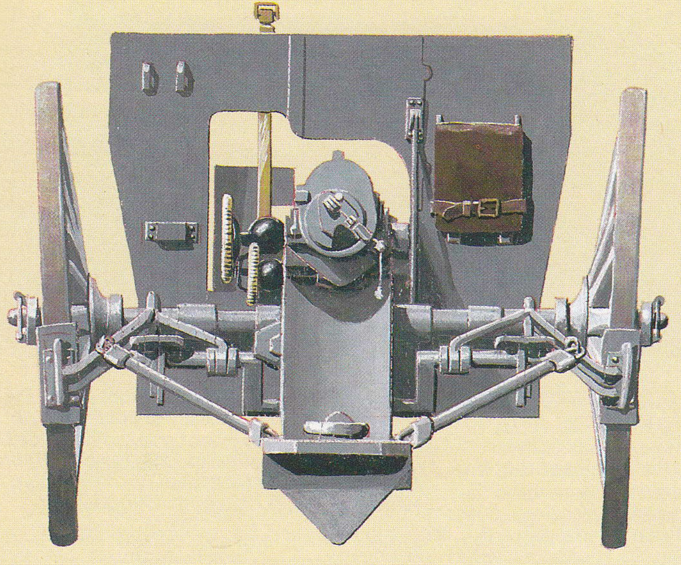


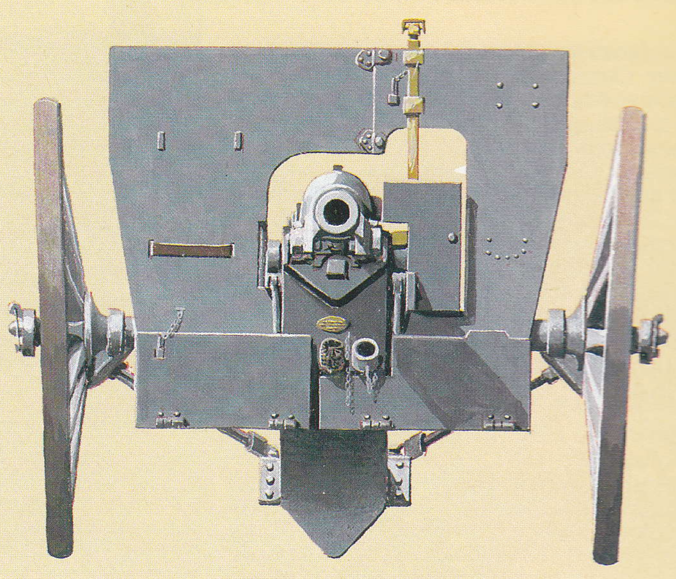
Above: An interested audience watches a 75-mm (2.95-in) mle 1897 in action near Steinbach. The gunners have dug a pit for the carriage trail to provide the barrel with more elevation and thus more range. Note the gunner by the breech waiting to close the breech block by a rapid hand movement once the round is loaded.

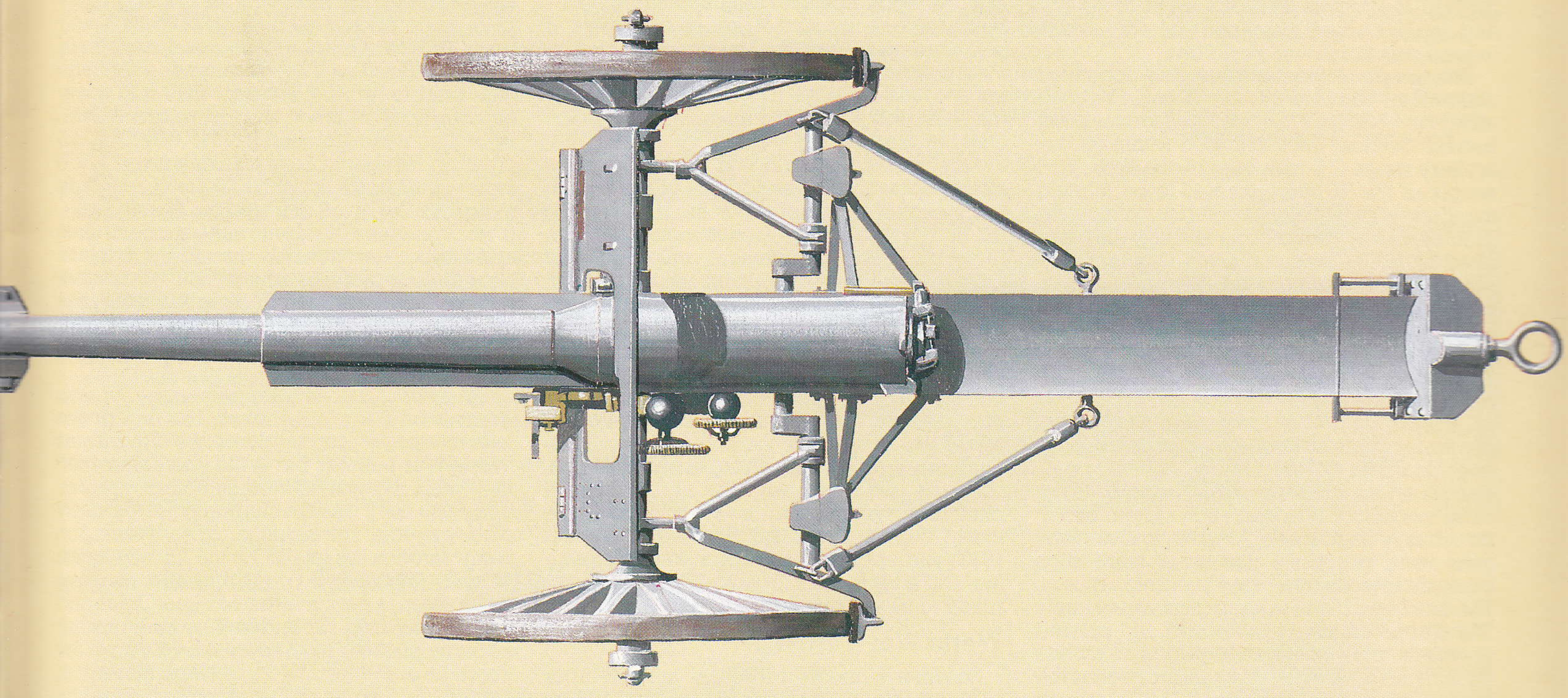
Canon de 75 mle 1897

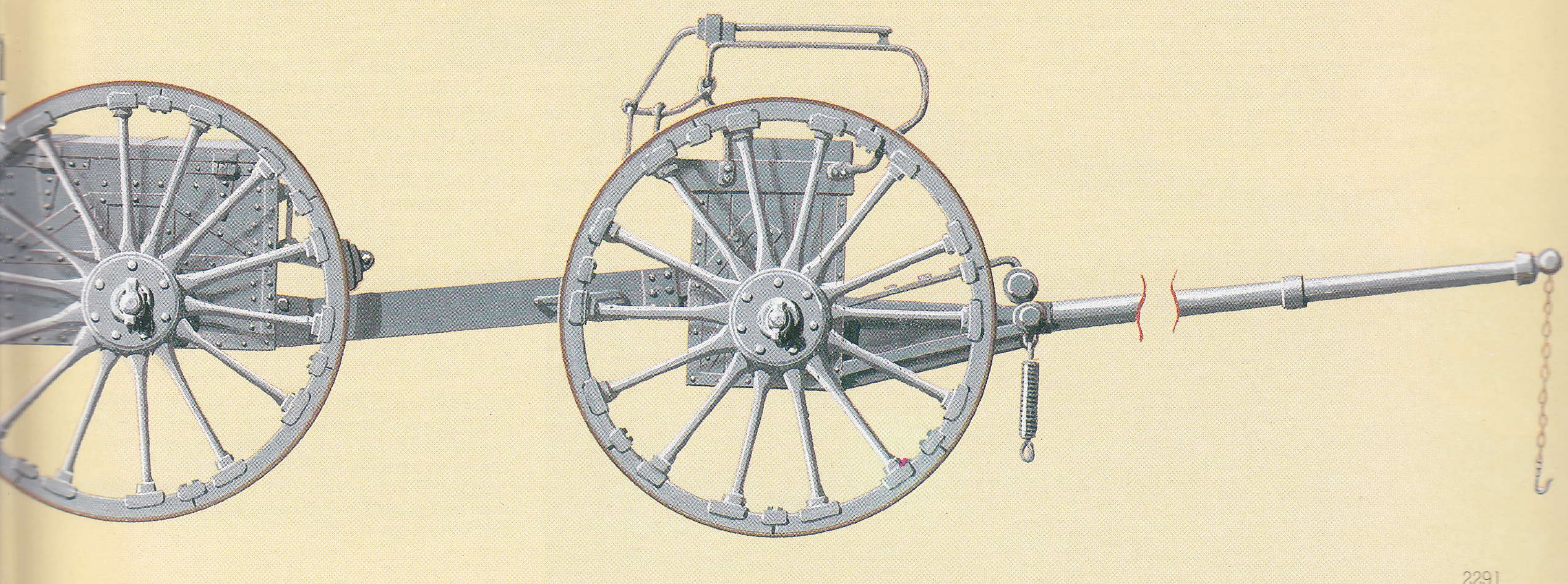
Right and below: The famous French '75' was supposed to be one of France's war-winners prior to 1914, and it had an unequalled rate of fire of up to 28 rounds a minute. It was also light in action and easy to handle. Its main claim to fame was its novel recoil mechanism that returned the barrel to its firing position after every shot, allowing the high rate of fire, but its shell weight was too light for the conditions prevalent on the Western Front after 1914 and its line of fire was too flat to reach into trenches or dug-outs. But the French had many of them, using them throughout the war and for long afterwards.











A pre-1914 photograph of a Model 1897, taken at a time when the French army expected to fight mobile battles over open terrain. The battles of 1914 drove the armies into the trenches where the 75 was unable to reach them but it remained the standard French field gun of World War I.

lack of shell weight made them no match for the heavy German howitzers and they suffered almost as much as the infantry during the opening battles of World War I. The protagonists reeled apart and started to entrench themselves for the peculiar state of siege warfare that was to last the next four bitter years. Here the '75' was not to shine for it fired in a low trajectory only, and against trenches and even lightly-defended field fortifications it was of very limited value. All it could do was scrape slight depressions into the terrain and produce some small measure of the semi-desert landscape that was to mark the Western Front.

Public craze

But before 1914 was out the '75' was already famous. To disguise the measure of their defeats on the Frontiers some French propagandist hit upon the idea that the '75' was the gun that 'saved' France. The French public seized upon the notion and the '75' became a public craze almost overnight. Songs were published lauding the gun, and the media used every method to promote the idea. Even jewellery and lapel badges depicted the '75', and a legend was born.

The troops on the battlefields no doubt had other ideas. The only way the '75' could be used along the Western Front was well forward, just behind the front lines and well within enemy artillery range. To make up for the light shell weight of the '75' the guns had to be massed together in large numbers: at one point in the 1916 battles at Verdun one entire valley was filled with '75s' massed wheel to wheel and kept constantly firing. Sheer numbers had to make up for the overall lack of firepower until heavier weapons reached the front, and it was no consolation to the French gunners to know that their shells could have little effect on the enemy trenches and earthworks.

During World War I the '75s' rolled off the production lines at Bourges and elsewhere in large numbers, but the mle 1897's recoil system was not an easy thing to make. Because of the close tolerances involved each system had to be virtually hand-made. Despite this so many guns were produced that some were soon being diverted to other uses than field artillery. The first French anti-aircraft guns were simply '75s' placed on steel frameworks and pointed skywards, while some were placed on mobile truck mountings. When the tank appeared the first French examples mounted the '75' as their main armament. Other '75s' were mounted on pedestals to defend French harbours and ports, or were placed into forts to replace guns stripped out during 1914 and 1915. Throughout this period the legend of the '75' persisted, to the extent that when the US Army arrived in France in 1917 without artillery it asked to be given batteries of '75s'. It duly got them, and so influenced were the Americans that they decided to produce a version as their standard field piece. The problem for them was that the French manufacturers would not give them the production drawings. In typical American style an mle 1897 was shipped to the USA and stripped down to the smallest component. The manufacturers were soon dismayed, for they saw that each mle 1897 was virtually a hand-built weapon produced at great cost in material and manpower. Yet the Americans wanted to mass produce the '75', so they set about revising the basic design to suit their production methods, and in so doing made the '75' a much cheaper (and better) weapon.

The '75' saw out World War I and in the years after the war there was no hope of the French army even thinking of replacing it: it was too much a symbol of the French victory of 1918. But some detail improvement could be made. For a start the box-section trail was eliminated, for that restricted elevation and extended range. A new box trail (through which the breech could be lowered as the barrel was elevated) was designed, but only a few were made. The reason seemed to be that as the '75' had seen the French through World War I it was good enough for the next, and no funds were forthcoming for such expensive changes. Changes did come with the introduction of pneumatic tyres so that the weapon could be towed behind trucks, but that was in the late 1930s and before long another war was looming. Once again the '75' would have to be put ready to save France.

World War II use

So when World War II started in September 1939 the '75s' were at the ready, often still on their original carriages, complete with wooden-spoked wheels. The old anti-aircraft guns were still emplaced on their elevated frames and on their original World War I trucks. Some (but not many) new equipments had been produced. A new form of '75' was used to arm a few of the Maginot Line forts, and some French tanks used the short-barrelled '75' as their main armament. It was all for nothing, as not even the '75' could withstand the Panzer hordes that swept across France in May 1940. Huge piles of all manner of French war booty fell into German hands, and with them went the '75s'. The '75' thus became a German gun, used to arm the Atlantic Wall and some garrison units in France and elsewhere. It even became an anti-tank gun in 1942 when the increasing number of Soviet T-34s proved to be impervious to the existing German anti-tank guns. The '75s' were dragged out from the booty stockpiles and fitted with new muzzle brakes and strengthening bands around the barrels. New armour-piercing ammunition was issued, and the gun became the 7.5-cm Pak 97/38, the '38' denoting that the Pak 38 carriage was used. It seemed to be the last indignity the '75' could suffer.

But even as that was happening the '75' was doing its bit across the Atlantic. The Americans had mastered production of the '75' just as World War I ended, but in the years after then they used the gun as their standard weapon. They also used it as the starting point for many other projects. For instance, when a tank gun was wanted in the late 1930s the '75' was taken virtually unchanged to arm the new medium tanks, later to become the M3 Lee/Grant and the M4 Sherman. The idea of a tank-busting airborne gun was mooted by the US Army Air Force so a '75' was fitted to a North American B-25 Mitchell bomber. Development gradually reduced the gun weight to the point where B-25s carried the '75' as an anti-shipping weapon in the Pacific. The weight of this airborne gun was low enough to be used as a light tank gun to arm the M24 Chaffee series. And all this occurred while the old American '75' field guns were used to train the new US Army ready for war. Some even saw action during the early stages of the Pacific war, and more were passed to the British army during the grim days of 1940 and 1941.

Thus the old '75' was still doing its bit to save France again, but this time in different hands. The '75' can still be found in many French cities adorning war memorials as a reminder of past glories. It remains one of the most famous guns ever produced.

Part of a French army mle 1897 battery in a field position near Elberfeld in 1915. Within a few short months positions such as these had been driven to shelter in trenches as the Western Front 'hardened' and artillery fire grew heavier. Scenes such as this were not to occur again until the battles of August 1918.

FRANCE

Canon de 105 mle 1913 Schneider

During the early 1900s the French Schneider & Cie took over much of the assets of the Russian Putilov concern, including the latter's arsenal at St Petersburg. When Schneider officials looked around the works they discovered a rather large and handsome gun chamberd for the standard Russian 107-mm (4.21-in) round. Subsequent investigations demonstrated that this equipment fired a useful shell to a good range, and the Schneider representatives decided that it would be a good gun to offer the French army. The design was subsequently taken back to France and rechambered for the French 105-mm (4.134-in) calibre; few other changes were necessary.

Unfortunately for Schneider & Cie the French army was not impressed. It already had large numbers of '75s' and there was no need for anything heavier, despite the fact that the 105-mm gun was not being offered as a field gun alone but more as a medium support weapon. Even so it took a great deal of lobbying and persuasion before the French army relented and purchased a relativley small batch in 1913. Thus this new French gun became the **Canon de 105 mle 1913 Schneider**, or more commonly in the service abbreviation of the time the **L 13 S**.

The first batch was duly delivered, but the French army remained unenthusiastic until after the start of World War I in 1914. After the Battle of the Frontiers and the arrival of trench warfare the shortcomings of the '75' became painfully apparent as it lacked shell weight and any significant effect on field fortifications, including trenches. But the L 13 S fired a much heavier shell and could have a considerble effect on such structures, and was thus soon in great demand. It was true that it fired its shell in a relatively flat trajectory that often prevented it from reaching down into trenches, but as a counterbattery weapon it was very useful. It was not long before Schneider was churning out the L 13 S as fast as it could.

In action the L 13 S was a much more cumbersome weapon than the handy '75', the long box trail was rather heavy, but it kept the gun stable when firing for prolonged periods. The overall design was basically simple and there were no frills, a carry-over from its Russian origins. The interrupted-screw breech was easy to operate but the ammunition took a bit of handling, especially after a prolonged period in action: the HE shell weighed 15.74 kg (34.7 lb). The L 13 S was often towed into action behind an eight-horse team with a small limber taking the weight of the trail, and in action the gun team could be as large as eight men, most of them handling the ammunition.

Numbers of L 13 S guns were handed over to the Belgian army during World War I and they were used among the Belgian positions on the River Lys. After 1918 L 13 Ss were handed over or sold to Italy (**Cannone da 105/28**) and Yugoslavia, and some ended up with the new Polish army. Most of these World War I veterans were still in use when 1939 came around and the L 13 S then took part in a new war. Most of the French L 13 S guns ended up in German hands after 1940 and many were used for beach defence as part of the Atlantic Wall, with the designation **10.5-cm Kanone 331(f)** or **K 333(f)**.

Specification

L 13 S

Calibre: 105 mm (4.134 in)

Length: of barrel 2.987 m (117.6 in)

Weights: in action 2300 kg (5,071 lb); travelling 2650 kg (5,843 lb)

Elevation: −5° to +37°

Traverse: 6°

Muzzle velocity: 550 m (1,805 ft) per second

Maximum range: 12000 m (13,123 yards)

Shell weight: 15.74 kg (34.7 lb)

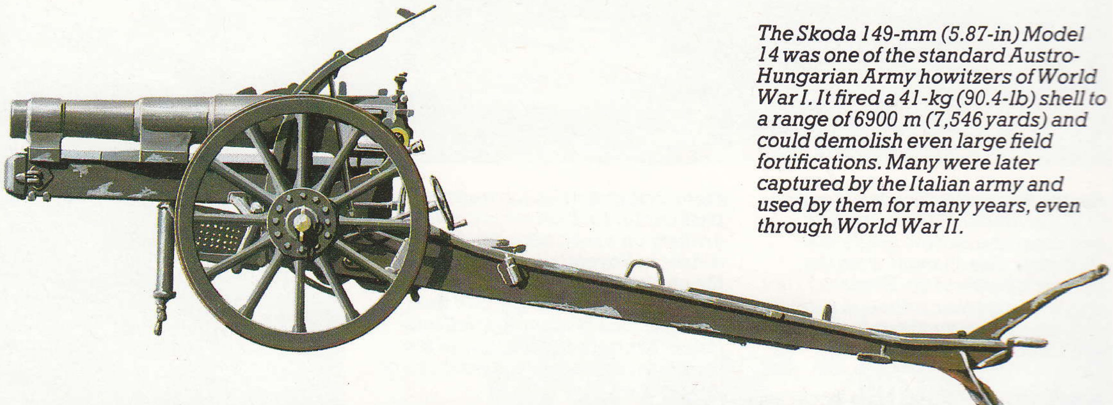
Above: French gunners take a rest close to their 105-mm (4.14-in) mle 1913 (L 13 S) somewhere in the Argonne region. Ammunition limbers are ready to the left of the gun, which has not yet been fired as the trail spade is not dug into the ground.

Below: A French battery near Amiens in April 1918 is armed with Schneider 105 mm mle 1913 heavy field guns, also known as the L 13 S. Originally derived from a Putilov design, they were among the best of the French artillery and were powerful enough to demolish German field works.

AUSTRIA-HUNGARY

Skoda 149-mm Modell 14 and Modell 14/16

In many ways the **Skoda 149-mm Modell 14** can be regarded as the medium howitzer equivalent to the 100-mm (3.94-in) Model 1914. The 149-mm (5.87-in) weapon was much larger and heavier, however, and was intended for use at higher artillery command levels than the 100-mm howitzer used by the field artillery: the 149-mm howitzer was used at regimental level and upwards, including corps artillery. The Modell 14 was intended for the destruction of major enemy emplacements and field works, and could be a very powerful weapon.

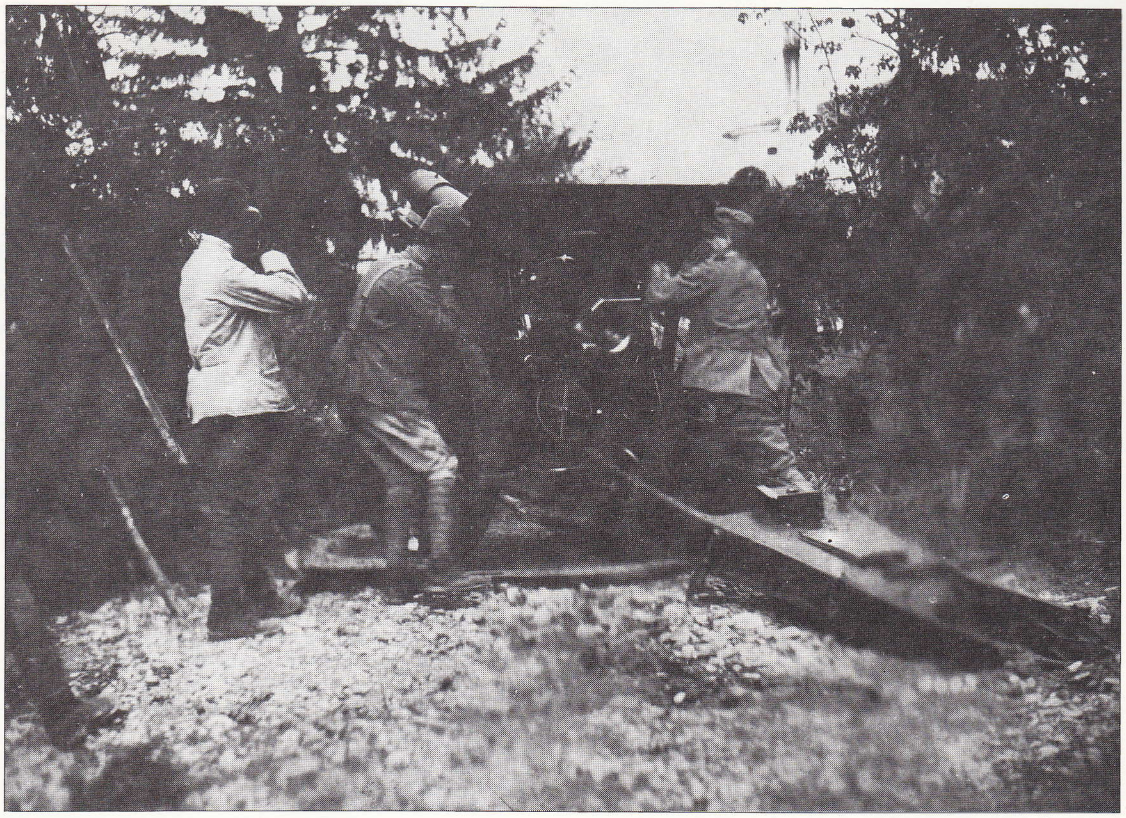


The Skoda 149-mm (5.87-in) Model 14 was one of the standard Austro-Hungarian Army howitzers of World War I. It fired a 41-kg (90.4-lb) shell to a range of 6900 m (7,546 yards) and could demolish even large field fortifications. Many were later captured by the Italian army and used by them for many years, even through World War II.

The Modell 14 was intended for use as a field howitzer only, and there was no facility to break the weapon down into loads as was the case with the smaller-calibre weapons. Instead the Modell 14 featured a large box trail, so heavy that a special trail lifting lever had to be fitted over the spades. This was used to effect large changes of traverse, and it required two men to lift the lever and move the carriage. The Modell 14 had a large shield (sometimes curved and sometimes straight), and the recoil mechanism under the barrel was large and heavy. In fact weight seemed to be the watchword of the Modell 14, and it required a large horse team to move the weapon. Despite all this weight the Modell 14 did not have a particularly good range: 6900 m (7,546 yards) was the maximum, even if the HE shell was quite destructive.

During 1916 a new version of the Modell 14 began to appear on the Skoda production lines. This was the **Modell 14/16**, which featured a slightly longer barrel and to provide more range fired a shell that was lighter than that of the Modell 14. The original Modell 14 ammunition could still be fired, and the Modell 14/16 shell could be fired from the Modell 14 if required, but this meant such a change in range tables and training etc. that this was rarely done. The new barrel and ammunition meant a range increase to 8790 m (9,613 yards) which was a help, but these were not the only changes. The Modell 14/16 had a new carriage design which was stronger and more stable than the original, but also heavier.

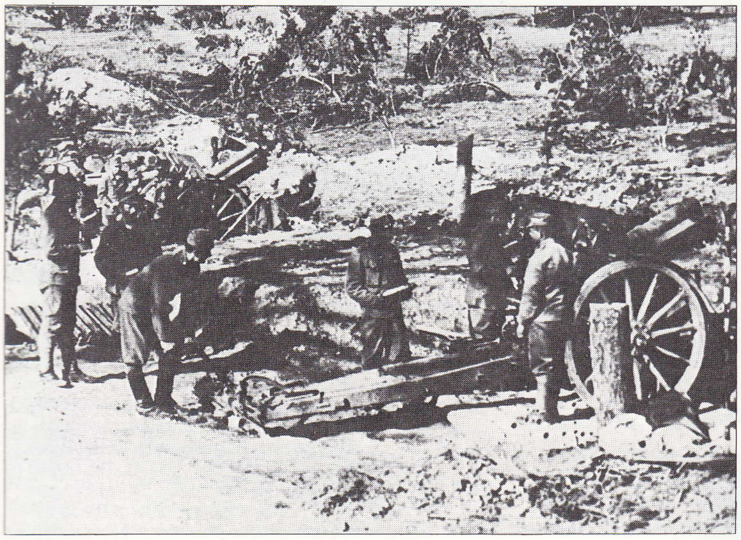
Both the Modell 14 and Modell 14/16 were used throughout World War I by the Austro-Hungarian armies, and gave good service. Many passed into Italian use, so many in fact that they were still the standard Italian medium howitzers in 1940, with the designations **obice da 149/12 modello 14** and **obice da 149/13**. After 1914 the howitzers were used by the Czech (**hruba houfnize vz 14** and **vz 14/16**), Austrian and Hungarian armies for many years.



An Austro-Hungarian Skoda Model 1914 149-mm howitzer is seen in action with Italian forces on the northern Italian front. These howitzers were used by both sides during the war, with the Italians capturing their stocks from the Austro-Hungarians – so many, in fact, that this model became a virtually 'Italian' gun during World War II.

and the Modell 14/16 in particular was the subject of a gradual series of improvements and modifications to keep it as up-to-date as possible. This involved the usual replacement of the wooden-spoked wheel with pressed steel wheels fitted with rubber tyres, but in addition new ammunition was introduced and the Hungarians went so far as to virtually rebuild their **M.14/35** howitzers, a programme that even involved the fitting of muzzle brakes to reduce recoil forces on the carriage when new ammunition was fired.

Both the Modell 14 and Modell 14/16 were sound and sturdy weapons, but they were rather heavy and, compared with many contemporary designs, lacked range. However, they were produced in such large numbers that many were on hand in 1939 ready for use in another war. Examples in German service were designated **15-cm schwere Feldhaubitze M.14 (Skoda)**, while ex-Italian equipments were **15-cm sFH 400(i)** and sFH401(i).



Austro-Hungarian Skoda 149-mm (5.87-in) Model 1914 heavy field howitzers in a battery position at Wolhynie. The changes from the battery lay-outs of the Western Front are very apparent, although shelters for men and ammunition have been prepared near the guns.

Right: British and Italian transport pass captured Austro-Hungarian artillery on a road near the Val d'Assa in November 1918. The gun in the immediate foreground is a Skoda 149-mm (5.87-in) Model 1914 field howitzer, one of many that fell into Italian hands to become one of the standard Italian artillery weapons of World War II.

Specification

Modell 14

Calibre: 149.1 mm (5.87 in)
Length: of barrel 2.09 m (82.3 in)
Weights: in action 2344 kg (5,168 lb); travelling 3070 kg (6,769 lb)
Elevation: −5° to +43°
Traverse: 5°
Muzzle velocity: 300 m (984 ft) per second
Maximum range: 6900 m (7,546 yards)
Shell weight: 41 kg (90.4 lb)

Modell 14/16

Calibre: 149.1 mm (5.87 in)
Length: of barrel 2.1 m (82.7 in)
Weights: in action 2765 kg (6,097 lb); travelling 3340 kg (7,365 lb)
Elevation: −5° to +70°
Traverse: 6°
Muzzle velocity: 350 m (1,148 ft) per second
Maximum range: 8790 m (9,613 yards)
Shell weight: 40.33 kg (88.9 lb)

Victory at Tannenberg

In 1914 the German war-plan called for an all-out effort to conquer France before Russia mobilized her colossal forces. Accordingly, the bulk of German forces stormed through Belgium and France while token forces faced the Russian juggernaut poised to invade East Prussia. But the Russian armies were divided, and a German staff officer, Max Von Hoffman, devised a plan which was to produce a crushing victory.

German planning made the defeat of France its primary objective after adoption of the Schlieffen Plan in 1905. Forces in the east would be on the defensive until a quick victory over the French allowed the transfer of forces. East Prussia was held by the 8th Army of four corps (I, XVII and X Corps, and I Reserve Corps), a reserve division, several Landwehr (territorial) brigades and a cavalry division, commanded by General von Prittwitz, with General Graf von Waldersee as his chief-of-staff. Additional Landwehr units were in the garrisons of Königsberg and the Vistula fortresses.

On 7 August the German Chief-of-Staff, Generaloberst Helmuth von Moltke, in accordance with the Schlieffen Plan, ordered Prittwitz to avoid encirclement and to retreat behind the Vistula if necessary. However, Prittwitz's deputy chief-of-operations, Oberst Max von Hoffman, preferred the aggressive approach of Schlieffen himself: 'Throw everything at the first Russan army to come within reach.'

The Russian North West Front (army group) under General Zhilinsky, attacking East Prussia, consisted of the 2nd Army based in Warsaw and the 1st Army at Kovno. The commanders were, respectively, Generals Samsonov and Rennenkampf. Their personal animosity hindered co-operation. Rennenkampf was to march on Königsberg through the Insterburg Gap, surround the fortress, and turn south to assist the northward drive of Samsonov. Rennenkampf, however, had only 6½ infantry and 5½ cavalry divisions available, although two divisions from the 2nd Army were subsequently transferred to him.

Samsonov had nine infantry and three cavalry divisions (excluding the two infantry divisions transferred to Rennenkampf). His army would advance into East Prussia between Soldau and Johannisburg, towards Allenstein and the Vistula. The 2nd Army, however, mobilized a considerable distance away from the frontier. August 23 was set as the date for both armies to be ready to cross the border.

French appeal

On 14 August the French appealed to Russia for immediate help, so on 17 August the 1st Army crossed the German frontier. Samsonov would not be able to cross the border in force until 21 August.

The German I Corps was around Gumbinnen with the XVII and I Reserve Corps nearby. Only the XX Corps and Landwehr units were left to observe the southern frontier. I Corps was to fall back, drawing the Russians into an encirclement. However, by 17 August and without orders the commander of the I Corps, General von Francois, had advanced to the frontier. He mauled the advancing Russians near the border town of Stalluponen but, uncertain of Russian locations, then withdrew to Gumbinnen. Rennenkampf made no attempt to pursue until 20 August, when he confronted the German position at Gumbinnen. A frontal assault by I Corps, XVII Corps (von Mackensen) and I Reserve Corps (von Below) was repulsed.

That day Samsonov penetrated the border. Von Prittwitz, acting on von Waldersee's advice (he had been a veteran *Kriegspieler* or wargamer, and had fought the battle out on a map many times) sent von Moltke a pessimistic appraisal of the situation and considered a retreat to the Vistula. Soon afterwards, however, von Hoffman presented his commander with a new plan. This was the one von Hoffman had preferred from the start, a shift for a decisive

Above: Russia's huge armies and the steady growth of her military power had been a source of great anxiety to Germany before the war. Inefficient staff-work and an obsession with fortresses combined to badly weaken the Russian forces in 1914.

Below: In 1914 there were probably more cavalry in Europe than ever before, but the proportion of mounted troops had of course declined considerably as breech-loading rifles and rifled artillery removed their tactical role; but cavalry remained the only arm capable of reconnaissance. Here, German lancers halt during the first days of the Tannenberg campaign.

Russian machine-gunners walk into captivity, bringing their weapons with them. The encirclement and surrender of Samsonov's 2nd Army and Rennenkampf's subsequent defeat led to vast quantities of military equipment falling into German hands, losses which the Tsarist armies could ill afford.

Cossacks spearhead the Russian advance into East Prussia. Both sides used large numbers of cavalry for reconnaissance, but German intelligence was assisted by the Russian armies' failure to encode their wireless messages.

blow against Samsonov. Prittwitz approved the plan, apparently abandoning any thoughts of retreat.

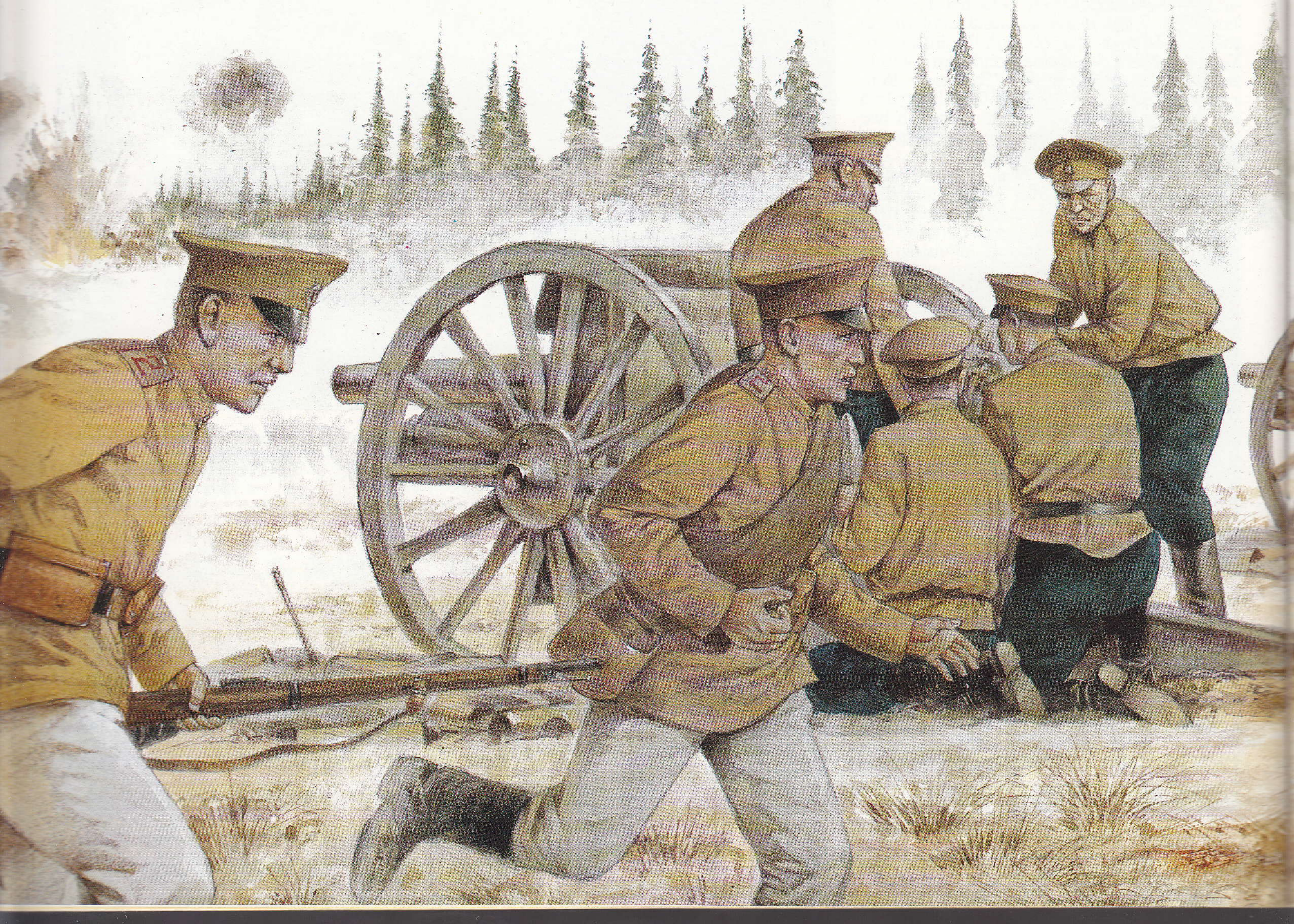
Berlin was not aware of these developments, however. Von Moltke feared losing East Prussia, even though the original Schlieffen Plan had allowed for that to happen. Von Moltke made a vital decision: he ordered five divisions (four infantry and one cavalry) to be pulled out of the German right wing along the Marne in France, decisively weakening the German drive on Paris. He also sacked von Prittwitz and von Waldersee, replacing them with General Paul von Beckendorff und von Hindenburg and Generalmajor Erich Ludendorff. These two men (the first called from retirement and the second from a staff position in France) would beome leaders of the German army and nation as a result of their action. Arriving on the scene, they despatched von Prittwitz and von Waldersee to the rear and ignominy. Ludendorff, however, knew von Hoffman personally and realized that his plan was excellent, so it remained in effect.

Samsonov was driving northwards by forced marches, and by 25 August his five corps were on a 100-km (62-mile) front, only 15 km (9.5 miles) from Allenstein.

Between 21 and 25 August, however, the Germans had used their excellent rail system

The Tannenberg Encirclement

The commanders of the two Russian armies invading East Prussia had publicly quarrelled before the war, and they made little effort to co-ordinate their action in 1914. The Germans left only covering forces in front of Rennenkampf and deployed their divisions to surround and annihilate Samsonov's 2nd Army.



to shift their forces facing Rennenkampf, except for some Landwehr and the 1st Cavalry Division, to attack Samsonov in the south. XX Corps and the 3rd Reserve Division had fallen back before Samsonov and were now south of Allenstein. I Corps arrived on the right, while XVII and I Reserve Corps railed in on the left. On 25 August intercepted Russian radio messages showed that Rennenkampf would present no threat to the German rear. Samsonov pressed forward, right into the German trap.

The trap is sprung

The Germans began their encirclement. On 26 August, von Francois took the village of Seeben on the Russian left. North east of Allenstine XVII and I Reserve Corps routed the Russian VI Corps. On 27 August Francois broke through the Russian left and captured Neidenburg, closing the ring. The three Russian centre corps (XIII, XV, and XXIII) were surrounded. By 29 August the Russians had been compressed into a pocket. On 30 August Samsonov ordered a breakout to the south. XV Corps took Neidenburg briefly, but the encirclement held, the pocket collapsed and Samsonov shot himself.

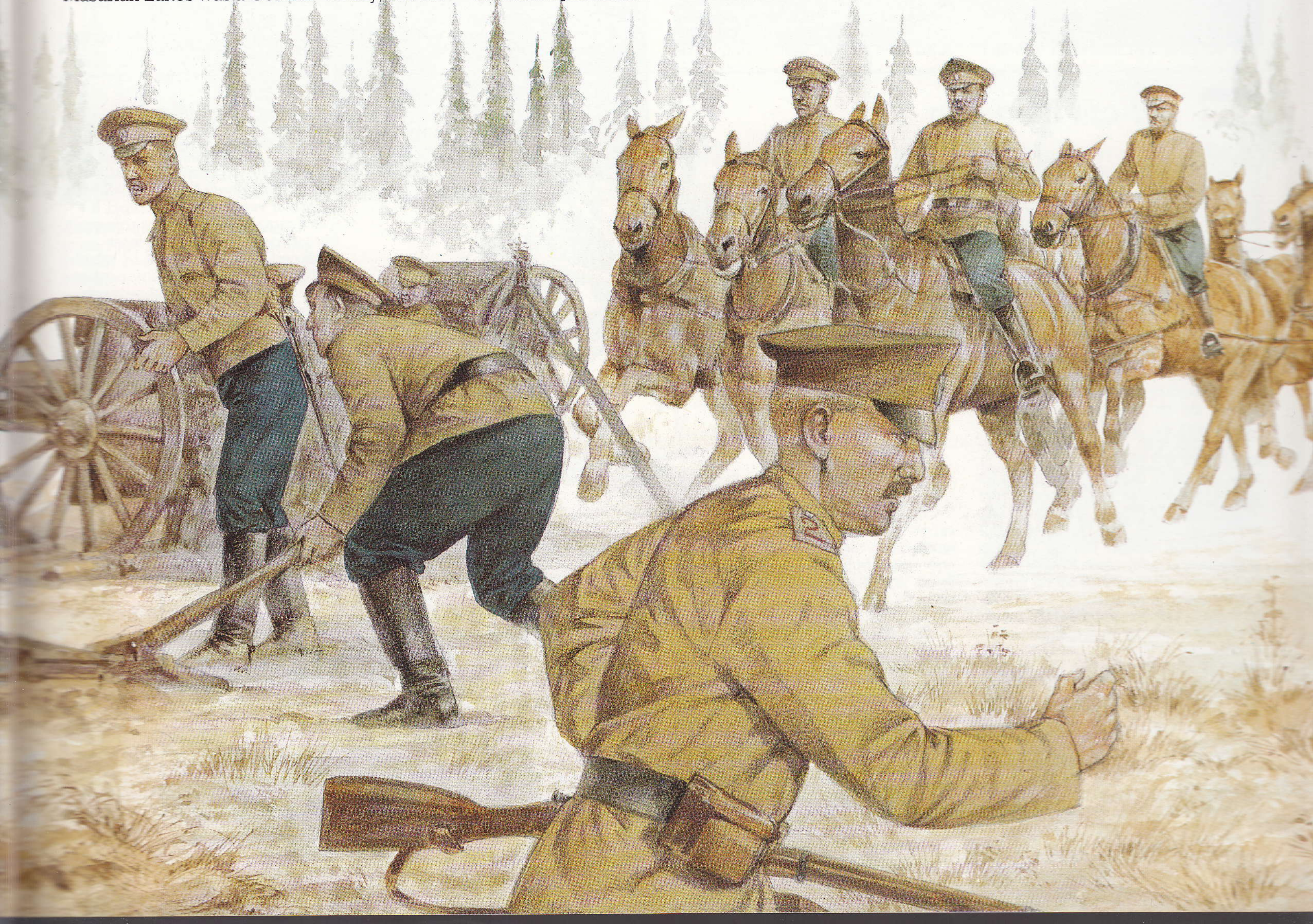
Some 90,000 Russians were taken prisoner along with 500 guns. Total Russian losses probably exceeded 120,000. Three corps had been annihilated and two others badly mauled. German losses in the whole campaign were not more than 10,000.

Von Hindenburg and Ludendorff then turned on Rennenkampf. The Battle of the Masurian Lakes was a German victory, but the Russians avoided encirclement. By 14 September the Russian 1st Army had withdrawn across the border.

The Battle of Tannenberg is significant because it demonstrated how a numerically inferior defender can use interior lines and mobility to defeat an attacker, certainly a lesson for NATO today. It also showed the crucial importance of planning in modern war. The Germans gained vital advantages from aerial reconnaissance and radio interception, both also vital today.

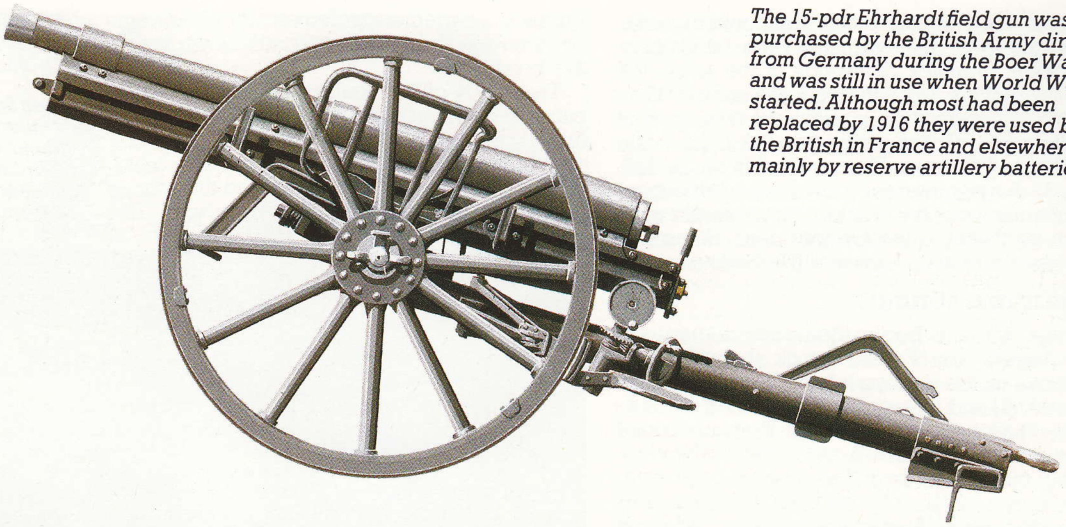
When Samsonov's 2nd Army surrendered, 90,000 Russian troops were taken prisoner. Here a column of prisoners is marched west, guarded by German second-line troops, while a fresh regiment marches to the front where surviving Russian forces were retreating into Poland.

As the German counter-attack took effect, the long-service gunners in the Russian army became less inclined to take risks on behalf of the conscript infantry and tended to pull out at the first sign of defeat. Samsonov's army was compelled to surrender at the end of August, and the dejected general walked alone into a pine forest and shot himself.



GERMANY

Ehrhardt field guns



The 15-pdr Ehrhardt field gun was purchased by the British Army direct from Germany during the Boer War, and was still in use when World War I started. Although most had been replaced by 1916 they were used by the British in France and elsewhere, mainly by reserve artillery batteries.

Although less well known outside Germany, the Ehrhardt concern of Düsseldorf was one of the more important German steel and weapons manufacturers, although it was often overshadowed by the giant Krupp concern. In time it underwent a series of mergers and take-overs that resulted in the Rheinmetall-Borsig AG conglomerate that was to become as big and as important as Krupp, but during the early 1900s it had to struggle to get what orders it could. One of these early 1900 orders was from the UK, no less, which was at that time still enmeshed in the 2nd Boer War, a war in which the UK's farmer opponents were better off for modern field artillery than the British army. In 1901 the British ordered 108 Ehrhardt field guns that were known to the British as the **Ordnance, QF, 15-pdr**. These guns had a calibre of 76.2 mm (3 in) and were regarded very much as stopgap equipment until something better came along, when the Ehrhardt guns were handed over to the Territorial Army field batteries. Some of these TA batteries still had their 15-pdr guns when they were ordered to travel to France during 1915, and for a while these were used until enough 18-pdr guns were on hand to replace them in 1916. A few more batteries of 15-pdr guns were sent to Egypt but these saw little, if any, action.

The 15-pdr guns were typical Ehrhardt designs as they prominently featured one of the main Ehrhardt trademarks, the pole trail carriage. Ehrhardt used the pole trail to enable the gun to be towed easily by horses as it combined strength with lightness. The company soon learned, however, that the pole trail restricted elevation (and thus maximum range) so later Ehrhardt guns featured what became known as the split pole trail. This had two tubular pole trail legs reaching back from the carriage cradle to a point well behind the breech at full recoil. A connecting tube then joined the two poles at right angles and to this connecting piece the single pole trail ran back to the trail spade and towing eye. This combined the lightness of the pole trail with the ability of the barrel to elevate as much as required, and this feature became a virtual Ehrhardt trademark, being used on many Ehrhardt mountain gun designs.

The British 15-pdr guns had the ordinary pole trail, and the first versions even had two seats over the axle to carry two gun crew members on the move. These were later replaced by a shield, and the original gun wheels were replaced by British service items. The Royal Artillery was not very impressed with the 15-pdr guns and, as already mentioned, they were replaced by 18-pdr guns as soon as possible.

1901 was a good sales year for Ehrhardt, for in that same year it received an order for 132 field guns from the Norwegian army. These guns were of 75-mm (2.95-in) calibre and differed in many details from the British 15-pdr pieces. Although Norway was not directly concerned with World War I, its **7.5-cm Feltkanon L631 M/01** Ehrhardt guns were kept in service throughout the war years and many of them were still in use when the Germans invaded Norway in 1940, whereupon they were designated **7.5-cm FK246(n)**.

Many other Ehrhardt guns were sold to South American nations.

Specification

15-pdr

Calibre: 76.2 mm (3 in)

Length: of barrel 2.286 m (90 in)

Weight: in action 1030.5 kg (2.272 lb)

Elevation: −5° to +16°

Traverse: 6°

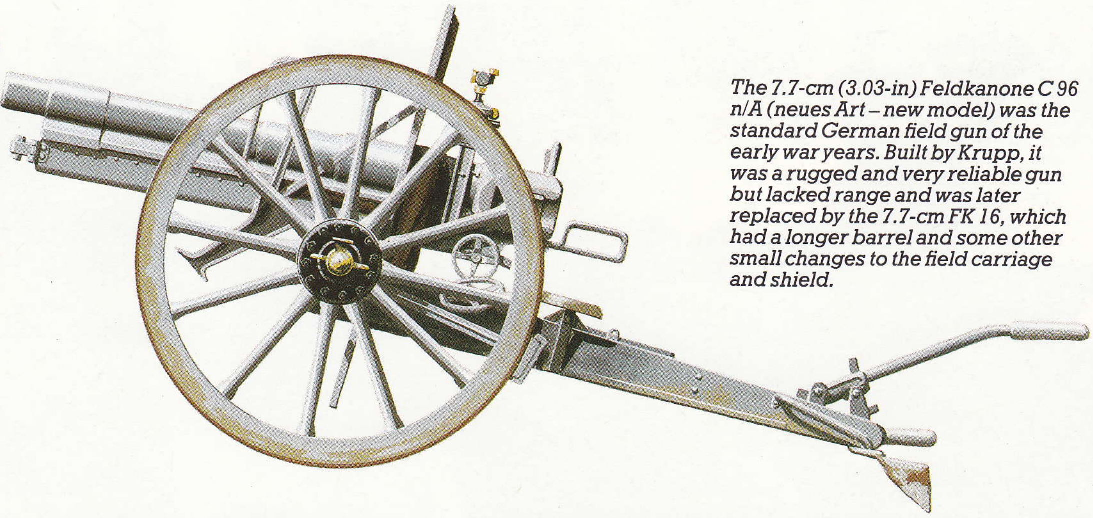
Muzzle velocity: 510 m (1,674 ft) per second

Maximum range: 5852 m (6,400 yards)

Shell weight: 6.35 kg (14 lb)

GERMANY

7.7-cm field gun

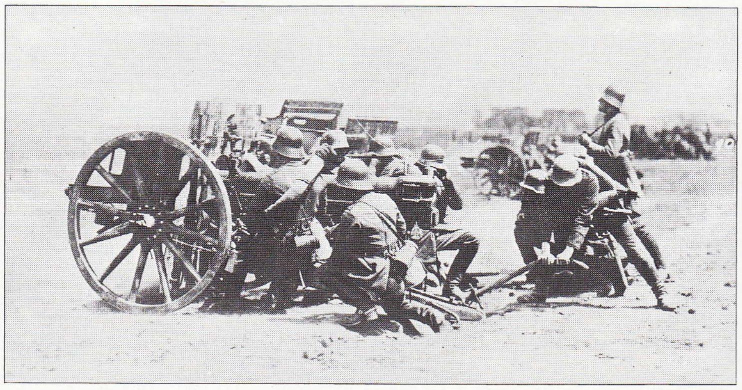


The 7.7-cm (3.03-in) Feldkanone C 96 n/A (neues Art – new model) was the standard German field gun of the early war years. Built by Krupp, it was a rugged and very reliable gun but lacked range and was later replaced by the 7.7-cm FK 16, which had a longer barrel and some other small changes to the field carriage and shield.

During the 1890s the German army asked Krupp to produce a field gun with a calibre of 77 mm (3.03 in). This odd calibre was chosen as it was realized that most potential enemies used field guns with calibres of 75 mm (2.95 in), namely France or 76.2 mm (3 in), namely Russia. Thus any captured guns could be bored out to take German ammunition but an enemy would be unable to do the same with captured German guns: this is an early example of this nation's thorough approach to war. In order to save manufacturing potential the new gun was to be mounted on the howitzer carriage of the day.

This gun was known as the **Feldkanone 96 n/A** (n/A for *neues Art*, or new model). It was the standard field gun of the German artillery arm when World war I began in 1914, and many served until 1918. The **FK 96 n/A** was a sound Krupp design, but the German gunners gradually came to appreciate that it lacked range and asked for improvements. New ammunition was introduced, but the main range increment came during 1916 with the introduction of a new and longer barrel; the carriage continued to be the original C/96 howitzer carriage and the breech mechanism of the FK 96 n/A was retained. This new field gun became known as the **7.7-cm Feldkanone 16** or **FK 16**, and it was rapidly adopted as the standard German field gun, replacing as many of the older models as possible.

The FK 16 introduced considerable range increase. With the old type ammunition the FK 96 n/A could manage only about 7000 m (7,655 yards) firing light shrapnel projectiles. The new FK 16 firing new streamlined shells could reach 10300 m (11,264 yards), which was a considerable in-



A German 7.7-cm (3.03-in) Feldkanone (FK) C 96 n/A is shown in action in the Champagne region with the barrel at maximum recoil. As the loader stands by with a fresh round the soldier at the end of the carriage trail prepares to make any laying corrections the layer next to the shield might call for.

7.7-cm field gun (continued)

crease. Some of this range increase had to be offset by an increase in overall weight but this price was borne willingly. The FK 16 could fire a wide range of ammunition types, all of them loaded separately, i.e. the shell and charge case were loaded as two items. As well as the usual shrapnel and high explosive (HE), the FK 16 was also used to fire various forms of gas shell. Compared with the earlier short projectiles, the improved ammunition for the FK 16 was much longer and more streamlined, offering less drag in flight. These shells were usually HE only; there were also smoke and illuminating projectiles.

Ammunition for the FK 16 was carried into action on a gun limber. A six-horse team was used to pull the gun and limber into action, but late in the war other animals such as oxen had to be used. The normal gun crew was six or seven men but often less were used once the gun was emplaced in a forward position; the rest then acted as ammunition handlers.

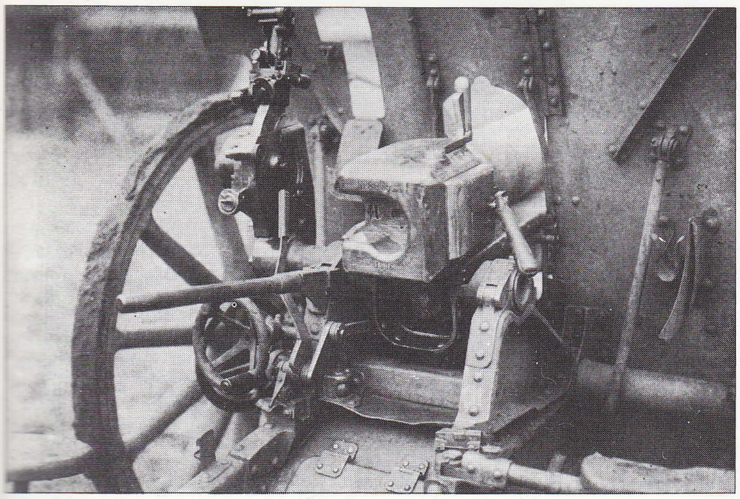
After 1918 the FK 16 was one of the few weapons allowed to the rump of the old German army. Others were handed out as war reparations to nations such as Belgium, and the Netherlands also received a number. Many of these FK 16s were converted to take 75-mm (2.95-in) barrels, including the German examples, so that when World War II came around there were virtually no 77-mm versions left other than a few training equipments. Many of the re-barrelled FK 16s were used throughout World War II.

Specification

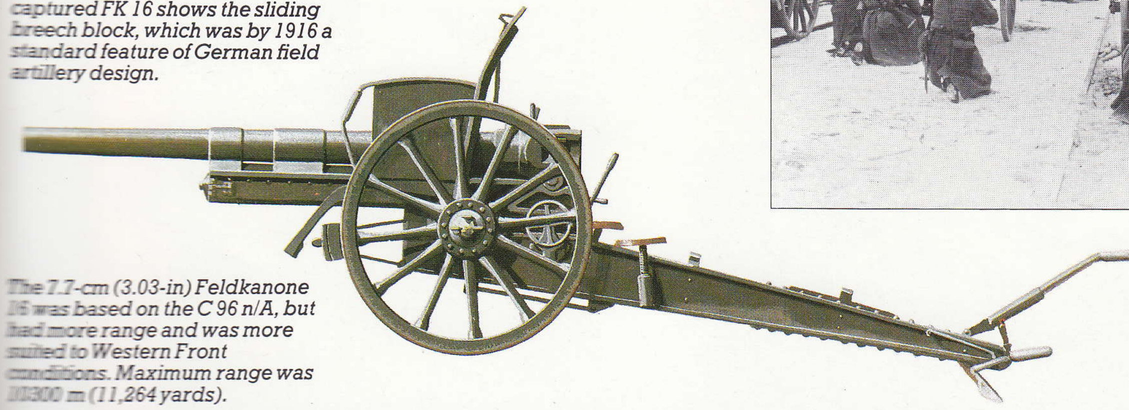
FK 16
Calibre: 77 mm (3.03 in)
Weights: in action 1422.5 kg (3,136 lb); travelling 2286 kg (5,040 lb)
Length: of barrel 2.70 m (106.3 in)
Elevation: −9.5° to +38°
Traverse: 8°
Muzzle velocity: maximum 600 m (1,968 ft) per second
Maximum range: 10300 m (11,264 yards)
Shell weight: streamlined HE 5.9 kg (13 lb)

Above: A German army 7.7-cm (3.03-in) C 96 n/A field gun in action in Poland during the 1915 summer campaign. The gun sight can be seen above the lowered gun shield flap and some ammunition carriers lie in front of the gun muzzle.

Below: German gunners train with 7.7-cm (3.03-in) C 96 n/A field guns on ranges somewhere in Germany during World War I. These guns, although replaced by the FK 16 in the field batteries after 1916, were still in use for training or by reserve batteries until the war ended in 1918.



Above: Detail of the breech of a captured FK 16 shows the sliding breech block, which was by 1916 a standard feature of German field artillery design.



The 7.7-cm (3.03-in) Feldkanone 16 was based on the C 96 n/A, but had more range and was more suited to Western Front conditions. Maximum range was 10300 m (11,264 yards).

Above: German gunners engaged in urban fighting against Bolshevik forces near Nariva, March 1918. The guns are 7.7-cm (3.03-in) FK 16s and the layer is aiming the gun over open sights. Note how the gun crew used the ammunition limber to obtain extra cover.

RUSSIA

76.2-mm Field Gun Model 00/02

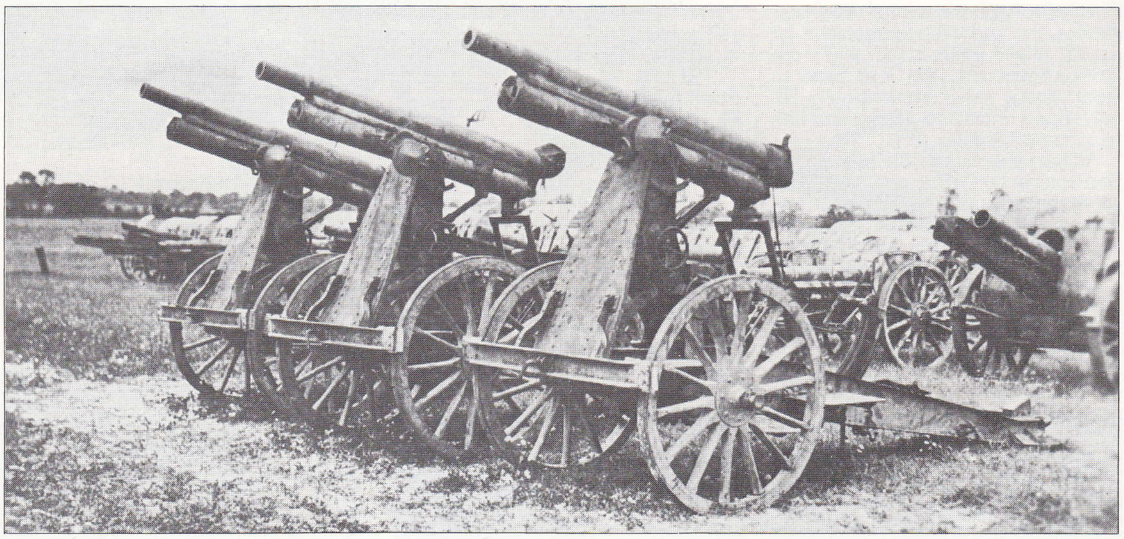
In 1914 the Russian army was desperately short of up-to-date field artillery, but this was not due to lack of production facilities or technological backwardness, as might be supposed. On the contrary, from 1906 vast sums of money were expended on artillery but were used to modernize the armament of the fortresses which protected the western frontiers of the Empire. These fortresses, which absorbed so large a proportion of the defence budget, proved to be of little use when the German army finally invaded, while the lack of modern field guns in the armies was a serious handicap.

Since the 1860s Russia had used field artillery based on Krupp designs. Although unable at first to afford the steel barrel construction of the German weapons, Russia demonstrated to the world the superiority of metal carriages over conventional wooden ones during the Russo-Turkish war in 1877. The campaign in Bulgaria revealed many shortcomings in the Russian army but probably saw the Tsarist army at the peak of its efficiency. Thereafter, its fortunes declined as vigorous officers like Skoboleff were passed over for political reasons.

Russian field artillery continued its reliance on Krupps, and its main field piece of World War I owed much to Krupp designs. The 76.2-mm Field Gun Model 00 was based on an older Krupp weapon, and had no recoil system other than a sprung spade under the axle. It had not been in service long before a more modern recoil system was fitted to produce the Model 00/02. This gun was produced at the Putilov arsenal at St Petersburg, which was the most modern facility in Russia at the time. Thus the Model 02 was very like many other Krupp designs of the period. The barrel was 30 calibres long and the usual Krupp steel section trail was copied almost exactly. A shield was provided, but this was often removed and replaced by two seats over the axle. One small feature that was to become a virtual Putilov trademark was to be seen at the front of the recoil mechanism cylinder: this was a peculiar embossed pattern that appeared on almost every subsequent Putilov product.

The quantities of field guns required by the massive Tsarist armies were so large that when World War I broke out many batteries were still using field guns that dated back to the 1870s. There were never enough Model 02s to go around, and the German victories of 1914 and after usually resulted in the guns that there were to hand being added to the pile of German war booty. All the Putilov workers could do was attempt to churn out as many Model 02s as they possibly could. Thus the Model 02 was kept in production for long after 1917, and so many were still in use by 1930 that a programme to modernize them was instituted. Thus when 1941 arrived the Model 02 was still in service as the **Model 02/30**, and captured examples were designated **7.62-cm leFk 294(r)** by the Germans.

Specification
Field Gun Model 00/02
Calibre: 76.2 mm (3 in)
Length: of barrel 2.286 m (90 in)
Weights: in action 1040 kg (2,293 lb); travelling 1965 kg (4,332 lb)
Elevation: −5° to +16°
Traverse: 5.5°
Muzzle velocity: 588 m (1,929 ft) per second
Maximum range: 6400 m (7,000 yards)
Shell weight: 6.5 kg (14.33 lb)



Russian Putilov 76.2-mm (3-in) Model 00 (1900) field guns were converted for the anti-aircraft role on modified garrison carriages and used by the Germans on the Western Front. This trio was captured at Chateau Thierry in July 1918.

RUSSIA

107-mm Field Gun Model 1910

Soon after production of the 76.2-mm (3-in) Model 00/02 got under way at the Putilov arsenal, the designers had an opportunity to assess what other artillery weapons would be needed by the Tsarist armies. At that time many of the heavy field batteries were equipped with a motley array of weapons, mainly of Krupp origins, and the Putilov designers decided to see what they could produce using their own talents. They soon demonstrated a real flair for designing modern artillery that was to come to full flower during World War II, for they produced a gun known as the **107-mm Field Gun Model 1910**.

This Model 1910 was one of the best designs of its generation. It was well-balanced and good-looking with an excellent all-round performance, and as time was to show it had a considerable amount of built-in growth potential. As was only to be expected, features from existing weapons (especially from some Krupp sources) were evident in the design, but it was innovative and demonstrated a good balance of weight and performance. The shell weighed 16.4 kg (36.15 lb) and could be fired to a very useful 12500 m (13,670 yards). The gun was towed by eight horses.

It was at this stage, just after production of the Model 1910 had commenced, that the Putilov concern got itself into severe financial difficulties. The state of the Russian economy was at best parlous, and the demands made upon it by rapidly expanding industries such as the defence concerns made it even shakier. The only way out the Tsarist officials could see was to attract foreign finance into such industries, and the French defence manufacturers descended on Russia like hawks. The massive Schneider & Cie concern soon took over the Putilov arsenal and poured in huge amounts of hard cash. In return it took what it could to bolster its own sales efforts, and the Model 1910 caught the French eye. The result was the 105-mm (4.134-in) Model 1913, or L 13 S.

Even with the financial backing of Schneider, production of the Model 1910 at St Petersburg never got anywhere near meeting demand until well into the war years. But by 1917 Model 1910s were flowing off the lines in considerable numbers, so many in fact that when the line closed in the period after the revolution of 1917 there were many Model 1910s for the new Red Army to use during the civil war and for years after. In 1930 the type was one of several chosen to be updated in an attempt to modernize the Red Army gun park. For the Model 1910 this meant a new and longer barrel and new ammunition; this produced the **Model 1910/30**. This gun was one that the Germans came to prize after the events of 1941, for it made an excellent weapon for use in the Atlantic Wall with the designation **10.7-cm K352(r)**. Thus the Model 1910/30 was used there alongside numbers of captured French L 13 S guns, and the two weapons that originated in St Petersburg many years before ended their service lives together.

Specification
107-mm Field Gun Model 1910
Calibre: 106.7 mm (4.2 in)
Length: of barrel about 2.99 m (117.7 in)
Weights: in action 2172 kg (4,788 lb); travelling 2486 kg (5,480 lb)
Elevation: −5° to +37°
Traverse: 6°
Muzzle velocity: 570 m (1,870 ft) per second
Maximum range: 12500 m (13,670 yards)
Shell weight: 16.4 kg (36.15 lb)

A Russian army 107-mm (actually 106.7-mm/4.2-in) Field Gun Model 1910 in action with Armenian gunners in Mesopotamia. This gun was the originator for the Schneider 105-mm (4.14-in) L 13 S used by the French army, and a modernized version was used in World War II.

India

Part 1

India devotes considerable resources to maintaining a large army and air force, and a growing navy. Having fought three wars since Independence and Partition (against China in 1962 and against Pakistan in 1965 and 1971), India still perceives a strong threat from both these quarters and has also voiced concern over the growth of superpower (especially US) naval activity in the Indian Ocean. The country's pattern of defence procurement reflects its non-aligned status. A three-pronged policy evaluates offers from potential European contractors against matériel available on soft credit terms from the Soviet Union, while encouraging the development of indigenous arms production or, at least, licensed-assembly in India. To date the USA has not been willing to grant export licences to India for its military hardware.

Indian Air Force

The Indian Air Force is divided into four operational commands, the South Western, Western, Central and Eastern. Administrative wings control about 50 fixed-wing squadrons each with 12-18 aircraft, as well as helicopter units and surface-to-air missile battalions. There are also Maintenance and Training Commands, the latter's resources being concentrated in the south of the country.

There are about 14 dedicated air-defence squadrons, most of them equipped with the Mikoyan-Gurevich MiG-21 (NATO reporting name 'Fishbed'). This ubiquitous fighter was first received in India during 1963, in MiG-21F form. Following the supply of 42 aircraft from the Soviet Union, assembly of the MiG-21F started at the Nasik plant of Hindustan Aeronautics Limited (HAL) in 1966, and about 200 were produced in the next eight years, the later aircraft incorporating increasing percentages of locally-fabricated material. The aircraft's engines and K-13A 'Atoll' air-to-air missiles were also produced by HAL. In 1974, production gave way to the MiG-21M close air support variant, of which 150 were produced, and 50 MiG-21MFs were also received direct from the Soviet Union.

In 1976-7 the Soviets delivered enough of the new third-generation MiG-21bis air-superiority fighter to equip three Indian squadrons, and this type subsequently entered production at Nasik, from where another 150 are likely to have flown before the programme ends in 1986. They have supplanted the MiG-21F/FL in most air-defence squadrons, and the Indians have integrated the Matra Magic AAM with the airframe. The IAF MiG-21F/FL/M/MF/bis squadrons are Nos 1, 3, 4, 7, 8, 15, 17, 21, 23, 24, 26, 28, 39, 30, 37, 45, 47, 101 and 108.

Another two air-defence squadrons operate MiG-23MF 'Flogger B' aircraft which were received in 1983, some two years after the Dassault-Breguet Mirage 2000 was chosen for the same role. Thirty-six single-seat Mirage 2000Hs and four of the two-seat 2000TH versions will be delivered in 1985-6.

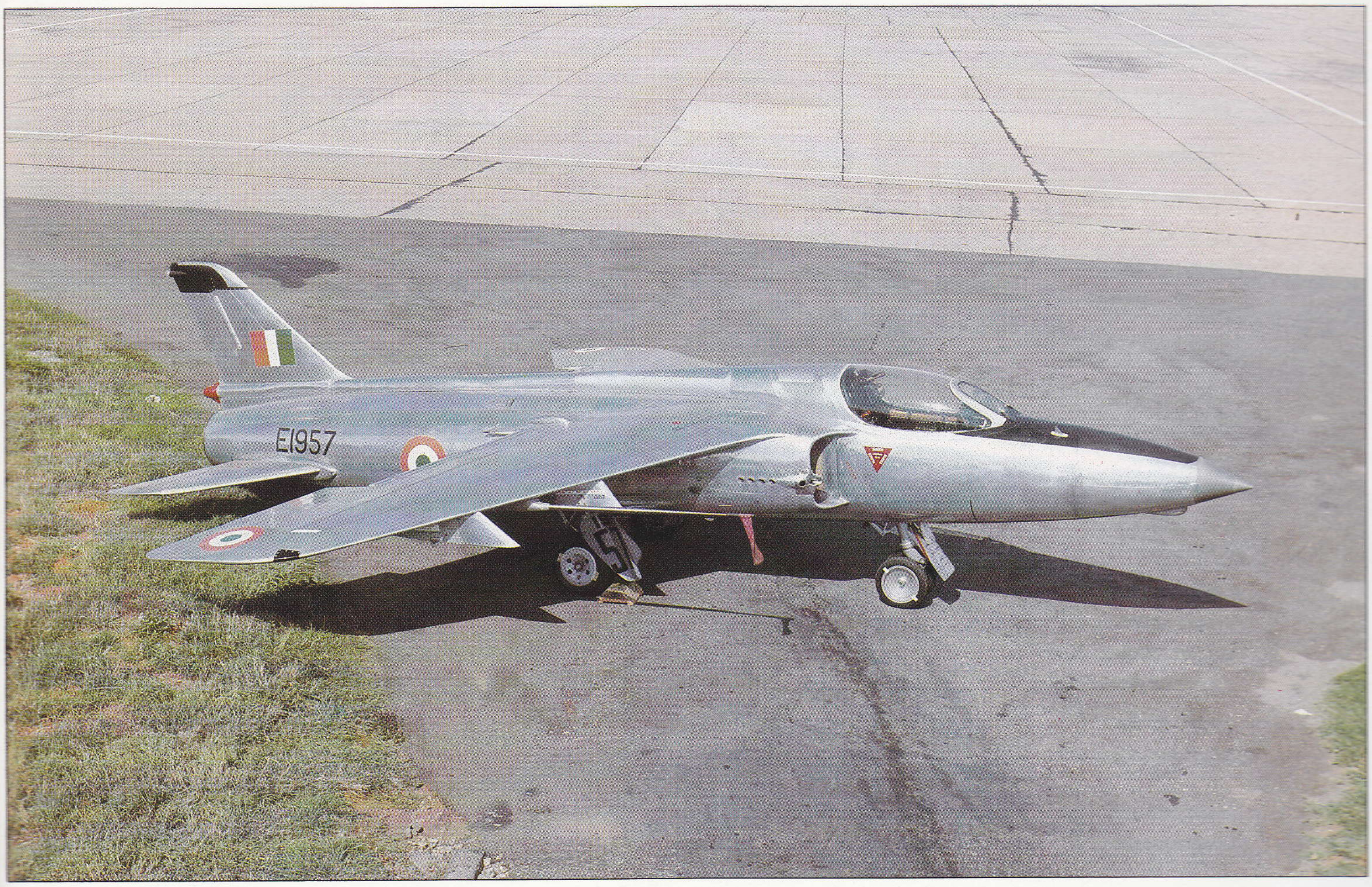
They will be equipped with the Matra Super 530 medium-range AAM as well as the short-range Magic. The Soviet Union agreed in 1984 to supply one of its new generation fighters, the MiG-29 'Fulcrum', and to permit its subsequent assembly and production by HAL. However, the timescale for these arrangements has not been authoritatively revealed. In any case, it is thought likely that the Indians will receive a downgraded version, perhaps utilizing the R-23 (AA-7 'Apex') and R-60 (AA-8 'Aphid') missiles already supplied to the IAF for use with its MiG-23MFs.

In addition to the half-dozen MiG-21M/MF squadrons, tactical air support duties are undertaken by three squadrons (Nos 10, 220 and 221) of MiG-23BN 'Flogger-F' aircraft which were delivered by sea in 1981-2 and assembled at HAL Nasik. Licensed production of the follow-on MiG-27 'Flogger-J' version, with fixed inlets, commenced at Nasik in 1984. These aircraft are replacing the remaining Hawker Hunter F.Mk 56As (No 20 Squadron), Sukhoi Su-7BMs (Nos 221 and 222 Squadrons) and HAL Maruts (No. 31 Sqn).

The Marut was HAL's early-1960s attempt to produce an indigenous supersonic fighter. It was later relegated to close air support, in which role it was joined by the HAL Ajeet, a development of the Folland Gnat lightweight fighter, which had been licence-produced in large quantities from 1959 to 1974. The Ajeets were delivered to Nos 2, 9 and 18 Squadrons from 1976 to 1982.

The SEPECAT Jaguar is replacing the Hunters and more particularly the BAC (English Electric) Canberras in the deep-penetration strike role in five squadrons. The first two units (Nos 5 and 14) were equipped with 40 aircraft built in the UK (including five two-seaters) and another 18 loaned temporarily from the RAF. The latter were later returned to the

The second production HAL Ajeet is seen at the company's Bangalore centre in January 1977. Though the main difference from the Gnat is the use of integral-tank wings, so that all four pylons can be used for weapons, many other improvements were incorporated.



SEPECAT Jaguars are replacing Hunters and Canberras in Indian service. Forty examples have been supplied from the UK and 76 more are being built under licence at Bangalore.

UK as production of a further 76 Jaguars at HAL's Bangalore factory gathered pace. These aircraft will have a second-generation nav-attack system to IAF specifications, and will carry Matra Magic AAMs in an overwing installation, with No. 27 Squadron the first to receive them. Late-production aircraft will incorporate a French radar and Exocet missiles so that they can replace No. 6's Canberras in the maritime strike role. However, some of the IAF's original 115 Canberras of assorted B(I).MK 58/B.Mk 66/ B.Mk 12/PR.Mk 57/PR.Mk 67/T.Mk 54 marques will survive in the photo-reconnaissance (No. 106 Squadron) and special duties (No. 35 Squadron) roles. Front-line photo-reconnaissance is performed by the dozen MiG-25R 'Foxbat B' aircraft received in 1981.

India wants to produce its own Light Combat Aircraft (LCA) in the early 1990s, and began soliciting co-operative proposals from European manufacturers in 1984.

The IAF's transport force is receiving a long-overdue modernization. The survivors of 78 jet-boosted Fairchild C-119Gs which served in Nos 12, 19 and 48 Squadrons for up to 30 years are being replaced by 95 Antonov An-32 medium-range transports.

The DHC Caribous in No. 33 Squadron, the Douglas C-47s in Nos 43 and 49 Squadrons and the DHC Otters which served Nos 41 and 59 Squadrons are also due to be relieved by a mix of An-32s and the new LTA (Light Transport Aircraft). This is the Dornier 228, of which over 100 are being licence-produced at HAL Kanpur. Some 40 will go to the IAF.

The Kanpur factory previously produced the BAe 748. Military examples of this British-designed transport serve with No. 11 Squadron, No. 106 Squadron (for photo-mapping) and with communications squadrons attached to Air HQ and the various commands. Three Boeing 737s are also in use at the Air HQ Communications Squadron.

The Mil Mi-8 'Hip' is India's standard transport helicopter, serving in the Helicopter Units Nos 105, 109, 110, 118, 119 and 121. Over 100 'Hips' were supplied, followed more recently by deliveries of the updated Mi-17 version. Some have been armed with rocket pods. The IAF also has five units of Aérospatiale SA 319 Alouette IIIs, most of which were licence-built by HAL as the Chetak (Helicopter Units Nos 104, 107, 113, 115 and 116). Ten Mil Mi-26s were ordered in 1985.

The IAF Elementary Flying School is at Bidar, where the 1950-vintage HAL HT-2 trainer is finally being replaced by the HAL HPT-32. However, it is possible that production will switch to the turboprop version (HTT-34) after an initial batch of 50 aircraft. A further 90 deliveries are planned.

The Air Force Academy is at Dundigal, where basic and advanced courses are conducted on the HAL Kiran Mk I and MK IA (armed version) jet trainers, of which 190 were built. A batch of 50 Polish-built PZL TS-11 Iskra jets was bought in 1975-6 for the Flying Training Wing at Hakimpet. These Iskras are likely to be phased out now that deliveries of the uprated Kiran Mk II are under way. Hakimpet also houses the Helicopter Training School's Chetaks.

The Fighter OCU is at Kalaikunda using Hunter F.Mk 56/T.Mk 66s, which were due to be replaced by a two-seat version of the Ajeet in the later 1980s. However, an Advanced Jet Trainer (AJT) project is now under way at HAL, which is soliciting overseas participation. Conversion training onto the Soviet fighter types is conducted at squadron level on the MiG-21U/MiG-23UM/MiG-25U or Su-7U.

A bomber OCU at Agra has some Canberra T.Mk 54s. The Transport Training Wing at Yelahanka has 17 HAL/BAe 748s, and a further seven of the type are used by the Navigation and Signal School at Begumpet. The Paratroop Training School at Agra still has C-119s. The Flying Instructor School at Tambaram uses the Kiran.

Specialist courses are conducted by the Tactics and Combat Development Establishment (TACDE) and the Test Pilots School within the Aircraft and Systems Testing Establishment (ASTE), which also evaluates all new aircraft and modifications for the IAF.

The IAF is also responsible for area air-defence by missiles. There are 27 battalions which received over 500 examples each of the SA-2 and SA-3 SAMs from the Soviet Union.

Indian Army air arm

This service has received the bulk of the 200-odd Chetaks (Alouette IIIs) and 150 Cheetahs (Aérospatiale SA 315B Lamas) produced by HAL under licence. Some of the Chetaks have been armed with the AS.11B wire-guided anti-tank missile. A batch of 12 Mil Mi-24 'Hind' anti-armour helicopters was received 'for evaluation' in 1984.

MBB has been chosen to collaborate with HAL on a new Advanced Light Helicopter (ALH) for the 1990s. Upon retirement from the IAF, some HT-2s are being refurbished for use by the army as elementary trainers. The army is responsible for short-range air-defence of its own formations and of airfields. For this purpose it has six battalions of SA-6 and SA-8 SAMs.

Three squadrons (Nos 10, 220 and 221) operate Mikoyan-Gurevich MiG-23BN 'Flogger-F' strike aircraft, which were assembled at Nasik by HAL. India is now manufacturing the follow-on MiG-27 under licence. These will replace Hawker Hunters, Sukhoi Su-7s and HAL Maruts in five squadrons.